ENGINEERING REPORT

City of Pretty Prairie, Kansas

Pretty Prairie
The name says it all.

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BUREAU OF WATER
PW00 4009

Water System Feasibility Study

December 2007
07-200-523-00; Phase 01

WILSON
&COMPANY

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Water System Feasibility Study

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December 2007
WCI File: 07-200-523-00; Phase 01

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SECTION 1 – PURPOSE AND SCOPE

1.1. Purpose

The City of Pretty Prairie (population 600) is located approximately 50 miles west of the City of Wichita. Refer to Figure 1.1 for a general location of the City of Pretty Prairie. The purpose of this engineering report is to provide the City of Pretty Prairie with a feasibility study of their existing raw water supply system and make recommendations of any improvements necessary. The portions of the water system that will be evaluated are the public water supply wells and any necessary treatment prior to entering the water distribution system.

1.2. Background

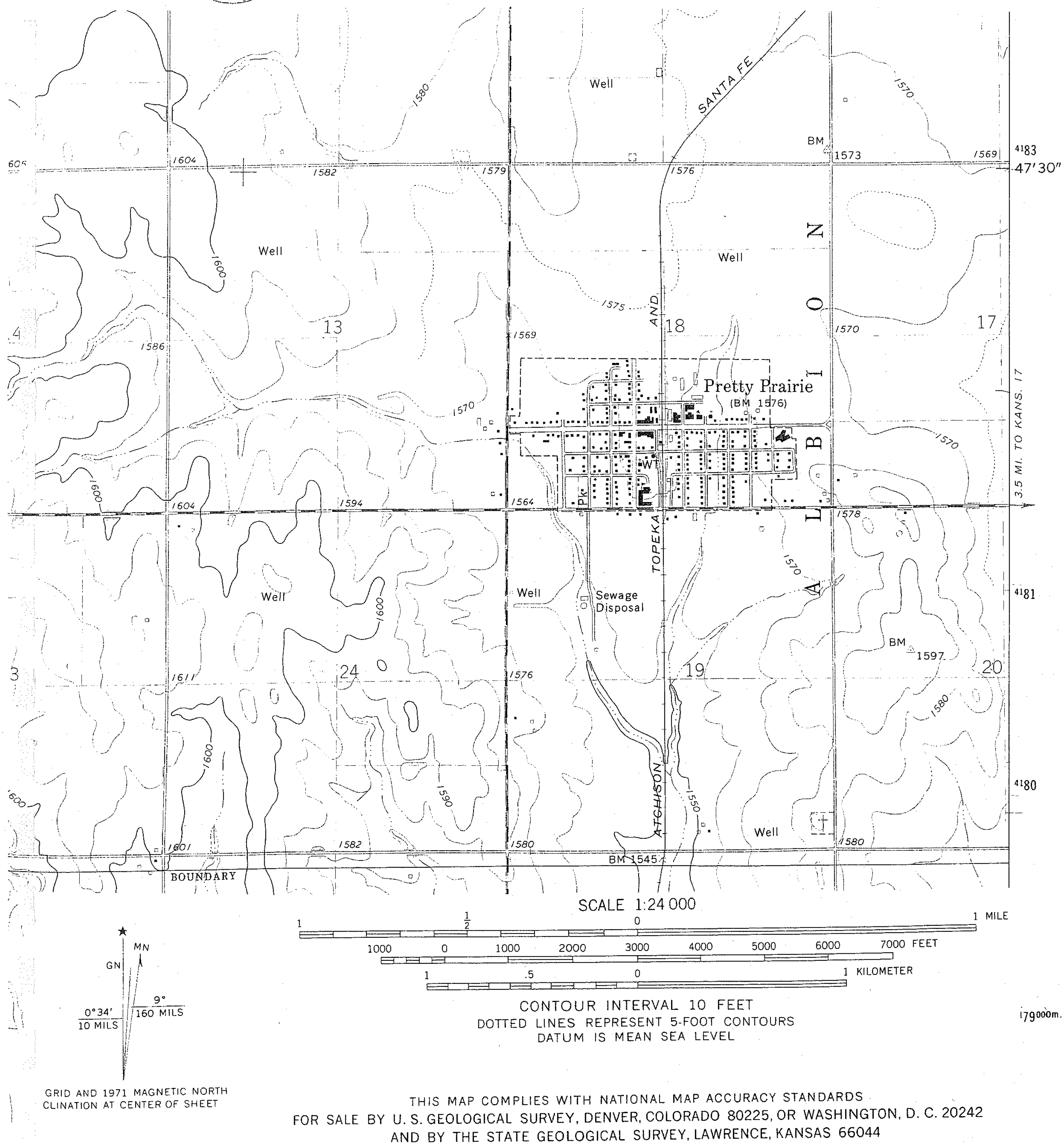
The City of Pretty Prairie receives water from three existing public water supply wells. Two of these wells are currently not in use due to very high nitrates. The one well that is in currently in use has also been shown to be high in nitrates. Because of these high nitrate levels the City was issued a directive from the Kansas Department of Health and Environment to obtain the services of a Kansas-licensed professional engineer to prepare a formal feasibility study to comply with the nitrate maximum contaminant level (MCL).

1.3. Study Scope

The City of Pretty Prairie contracted with Wilson & Company to complete this engineering report, which includes the following general scope of work:

Water System Feasibility Study

- Determine the current and future design population for any necessary improvements.
- Determine the design treatment capacity, raw water quality parameters, and finished water quality parameters for any necessary improvements.
- Analyze and provide cost estimates for the following alternatives:
  - Obtain a new raw water supply with lower nitrate levels by drilling a new municipal water supply well.
  - Obtaining water of acceptable quality from another public water supply within close proximity.
  - Treat the existing water supply wells to reduce nitrates by utilizing one of the following alternatives:
    (1) Proper blending of water supply wells
    (2) Installation of individual household reverse osmosis units
    (3) Installation of a centralized nitrate treatment plant.
- Provide recommendation of the most feasible alternative.
- Analyze funding options and complete a water rate analysis.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DOTTED LINES REPRESENT 5-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL
179000m.
GRID AND 1971 MAGNETIC NORTH
CLINATION AT CENTER OF SHEET
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D. C. 20242
AND BY THE STATE GEOLOGICAL SURVEY, LAWRENCE, KANSAS 66044

SECTION 2 – EXISTING RAW WATER SUPPLY SYSTEM ANALYSIS

2.1. Existing Raw Water Supply System

The City of Pretty Prairie currently supplies drinking water to the citizens in Pretty Prairie. The City receives groundwater from three existing public water supply wells (Well #3, #4, and #5). Refer to Figure 2.1 on the following page for a general location of the City of Pretty Prairie, the location of their existing public water supply wells. Refer to Table 2.1 for general information on each of these wells.

Table 2.1 – Well Data

Well No.	Year Drilled	Pump Rate (gpm)	Well Depth (feet)	Depth to Water (feet)	Comments
3	1954	200	60	20	Not being used due to high nitrates
4	1960	300	60	20	Not being used due to high nitrates
5	1994	350	97	27	---

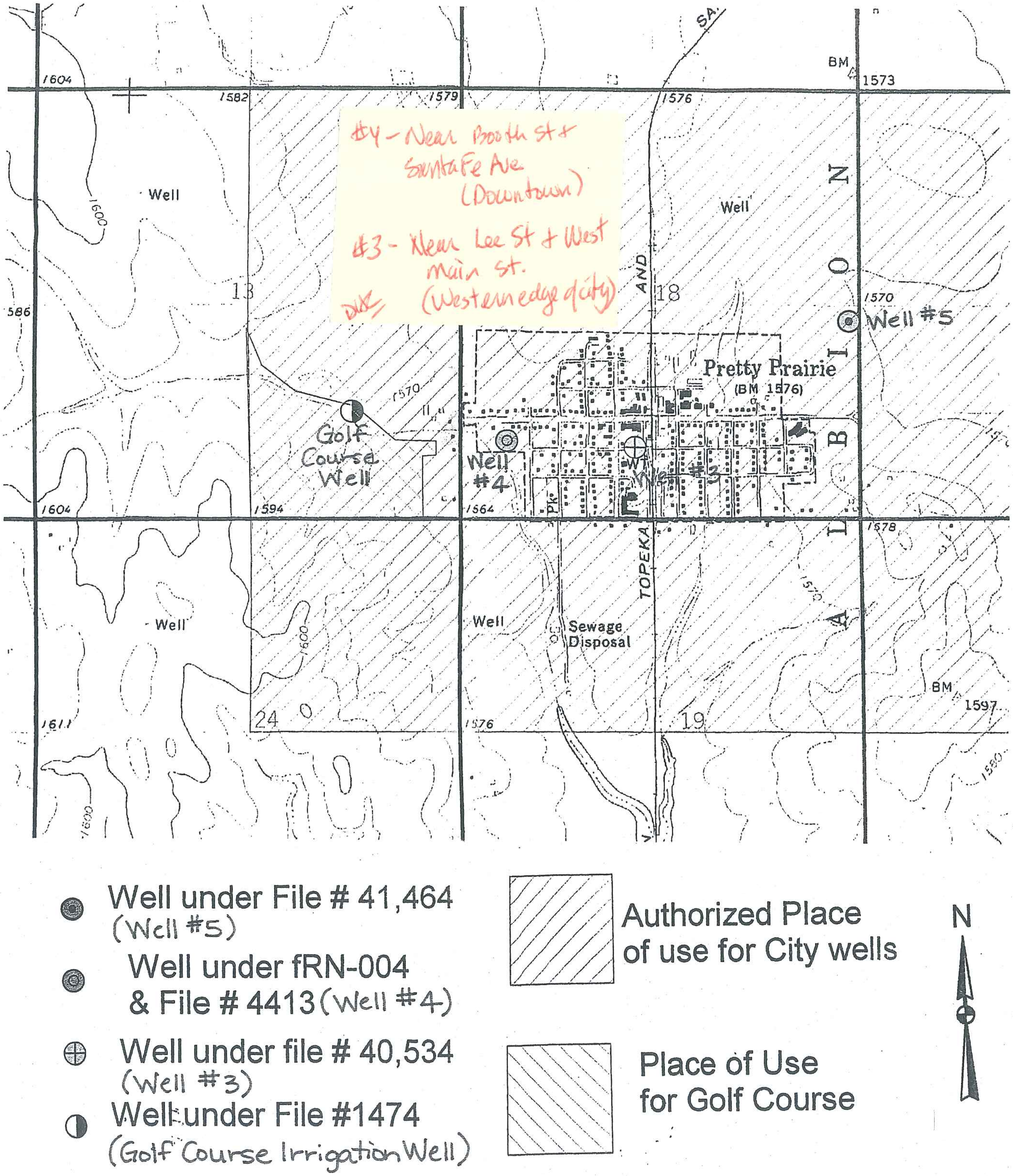
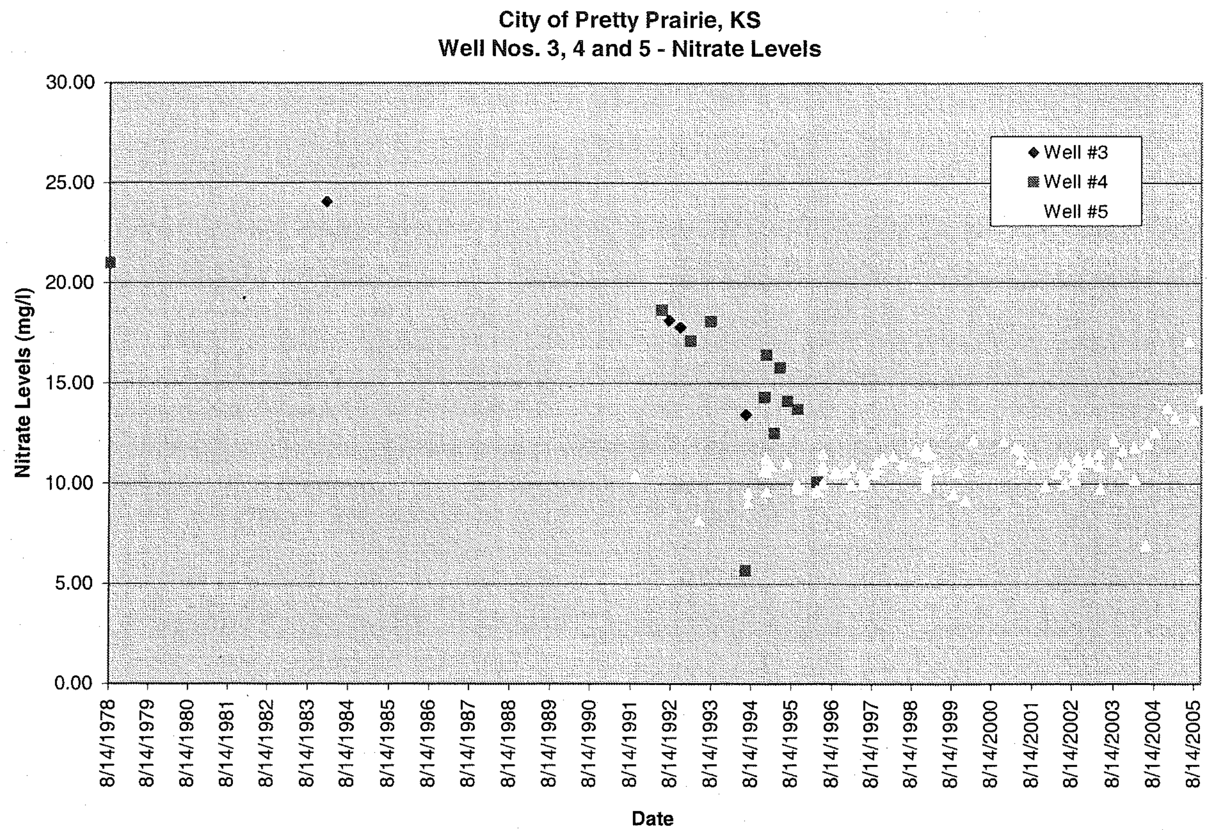


Figure 2.1 – Existing Raw Water Supply System

2.2. Nitrate Levels

The City is currently not utilizing Well Nos. 3 and 4 due to the high levels of nitrates. Well No. 3 had an average nitrate level of 18.35 milligrams per liter (mg/l) and Well No. 4 had an average nitrate level of 14.79 mg/l. The nitrate standard or maximum contaminant level (MCL) is 10.00 mg/l. Refer to Figure 2.1 which shows the historical nitrate levels for Well Nos., 3, 4, and 5.

Figure 2.1 –Nitrate Levels at Well Nos. 3, 4 and 5



Due to the high levels of nitrate in Well Nos. 3 and 4, the City drilled a new well, Well No. 5 in 1994. This well has serviced the City for many years, but over the years the nitrate levels have increased. Refer to Table 2.2 for nitrate levels from Well No. 5 since it was drilled and came on line in November 1994. The overall average nitrate level of Well No. 5 is 10.37 mg/l. This is slightly above the nitrate standard or maximum contaminant level (MCL) of 10.0 mg/L.

Table 2.2 – Nitrate Levels at Well No. 5

Well No. 5			
Date	Nitrate Level (mg/l)	Nitrate Limit (mg/l)	Comments
11/1/1994	7.70	10.00	
11/1/1994	7.70	10.00	
11/1/1994	8.40	10.00	Taken at 409 E Main
11/2/1994	8.20	10.00	
11/3/1994	2.10	10.00	
11/8/1994	7.40	10.00	Taken at City Office
11/9/1994	7.60	10.00	
11/14/1994	8.00	10.00	
11/16/1994	8.59	10.00	Taken at Wagon Wheel
11/16/1994	9.00	10.00	Taken at Pretty Prairie Grade School
11/16/1994	9.08	10.00	Taken at Strohl Oil
11/23/1994	9.50	10.00	
11/23/1994	9.40	10.00	
11/29/1994	9.60	10.00	
12/2/1994	9.05	10.00	
12/2/1994	9.38	10.00	Taken at City Office
12/6/1994	9.30	10.00	
12/6/1994	8.81	10.00	
12/14/1994	8.67	10.00	
12/23/1994	9.56	10.00	
1/4/1995	9.29	10.00	
1/9/1995	8.97	10.00	
1/23/1995	9.00	10.00	
1/30/1995	9.24	10.00	Taken from 320 S Rhodes
2/2/1995	9.26	10.00	
2/7/1995	8.96	10.00	
2/7/1995	9.47	10.00	Taken from 403 E Main
2/15/1995	9.27	10.00	All samples from this point on no longer use bacteria samples for nitrate samples
2/21/1995	8.80	10.00	
3/1/1995	9.54	10.00	
3/9/1995	9.35	10.00	
3/16/1995	9.31	10.00	
3/22/1995	9.41	10.00	
3/30/1995	9.22	10.00	
3/30/1995	10.60	10.00	
4/5/1995	9.23	10.00	
4/13/1995	9.40	10.00	
4/20/1995	9.58	10.00	
4/26/1995	9.59	10.00	
5/3/1995	9.54	10.00	
5/12/1995	9.64	10.00	
5/17/1995	9.65	10.00	
5/24/1995	9.53	10.00	
6/1/1995	10.00	10.00	
6/6/1995	9.69	10.00	
6/15/1995	9.88	10.00	
6/21/1995	9.75	10.00	
6/27/1995	10.40	10.00	
6/28/1995	9.81	10.00	

Table 2.2 cont'd – Nitrate Levels at Well No. 5

Well No. 5			
Date	**Nitrate Level (mg/l)**	**Nitrate Limit (mg/l)**	**Comments**
6/28/1995	11.31	10.00	
7/3/1995	10.10	10.00	
7/7/1995	10.10	10.00	
7/10/1995	10.30	10.00	
7/19/1995	8.00	10.00	
7/24/1995	10.20	10.00	
7/25/1995	10.40	10.00	
7/28/1995	10.20	10.00	
7/28/1995	9.50	10.00	
8/1/1995	10.90	10.00	
8/4/1995	10.50	10.00	
8/17/1995	10.60	10.00	
9/7/1995	10.00	10.00	
9/15/1995	10.30	10.00	
9/18/1995	10.20	10.00	
9/26/1995	9.84	10.00	
9/26/1995	10.66	10.00	
10/25/1995	10.40	10.00	
10/25/1995	10.36	10.00	
11/16/1995	10.60	10.00	
1/2/1996	10.40	10.00	
1/12/1996	10.40	10.00	
1/31/1996	10.20	10.00	
2/27/1996	10.20	10.00	
3/26/1996	9.75	10.00	
3/26/1996	10.92	10.00	
5/14/1996	9.81	10.00	
5/16/1996	9.98	10.00	
5/16/1996	11.06	10.00	
6/14/1996	10.30	10.00	
7/16/1996	10.60	10.00	
8/27/1996	9.77	10.00	
9/18/1996	9.65	10.00	
10/16/1996	10.10	10.00	
12/17/1996	9.65	10.00	
2/13/1997	10.00	10.00	
4/30/1997	10.70	10.00	
5/19/1997	10.90	10.00	
5/21/1997	10.50	10.00	
5/29/1997	10.60	10.00	
8/27/1997	10.60	10.00	
9/17/1997	10.90	10.00	
9/22/1997	10.50	10.00	
9/22/1997	9.97	10.00	
11/12/1997	10.00	10.00	
11/12/1997	10.00	10.00	
2/17/1998	10.30	10.00	
5/13/1998	10.50	10.00	
9/16/1998	10.70	10.00	
9/22/1998	10.40	10.00	
12/16/1998	11.10	10.00	

Table 2.2 cont'd – Nitrate Levels at Well No. 5

Well No. 5			
Date	Nitrate Level (mg/l)	Nitrate Limit (mg/l)	Comments
12/21/1998	11.20	10.00	
12/21/1998	11.30	10.00	
12/21/1998	11.40	10.00	
12/28/1998	11.00	10.00	
12/28/1998	11.70	10.00	
12/28/1998	11.70	10.00	
12/30/1998	11.40	10.00	
12/30/1998	11.50	10.00	
12/30/1998	11.60	10.00	
3/29/1999	10.60	10.00	
6/16/1999	10.90	10.00	
6/30/1999	11.40	10.00	
6/30/1999	11.90	10.00	
6/30/1999	11.10	10.00	
8/30/1999	11.80	10.00	
9/30/1999	10.30	10.00	
12/16/1999	10.00	10.00	
12/16/1999	10.40	10.00	
2/24/2000	9.91	10.00	
8/28/2000	10.70	10.00	
9/6/2000	11.00	10.00	
9/13/2000	12.70	10.00	
9/25/2000	12.03	10.00	
11/6/2000	16.60	10.00	
11/27/2000	13.60	10.00	
11/30/2000	10.40	10.00	
3/21/2001	11.50	10.00	
4/27/2001	10.80	10.00	
5/4/2001	9.50	10.00	
8/7/2001	10.60	10.00	
12/10/2001	9.21	10.00	
3/29/2002	12.20	10.00	
4/30/2002	12.10	10.00	
6/7/2002	11.80	10.00	
6/13/2002	11.70	10.00	
8/26/2002	11.20	10.00	
9/3/2002	11.00	10.00	
9/27/2002	9.86	10.00	
10/7/2002	10.50	10.00	
1/7/2003	11.00	10.00	
1/15/2003	10.00	10.00	
4/2/2003	11.00	10.00	
4/9/2003	10.60	10.00	
4/16/2003	10.20	10.00	
8/11/2003	11.30	10.00	
8/18/2003	10.90	10.00	
8/25/2003	11.30	10.00	
9/18/2003	11.30	10.00	
11/3/2003	11.50	10.00	
2/17/2004	10.90	10.00	
2/23/2004	9.75	10.00	

Table 2.2 – Nitrate Levels at Well No. 5

Well No. 5			
Date	**Nitrate Level (mg/l)**	**Nitrate Limit (mg/l)**	**Comments**
6/3/2004	12.20	10.00	
6/12/2004	12.20	10.00	
8/23/2004	12.10	10.00	
12/6/2004	11.00	10.00	
2/14/2005	11.70	10.00	
6/21/2005	11.80	10.00	
8/2/2005	10.20	10.00	
10/12/2005	6.94	10.00	
1/6/2006	12.00	10.00	
5/1/2006	12.60	10.00	
6/19/2007	13.30	10.00	
7/19/2007	13.70	10.00	
8/27/2007	17.10	10.00	
9/11/2007	13.20	10.00	
10/16/2007	14.20	10.00	

MINIMUM	2.10
AVERAGE	10.37
MAXIMUM	17.10

- meaning GM

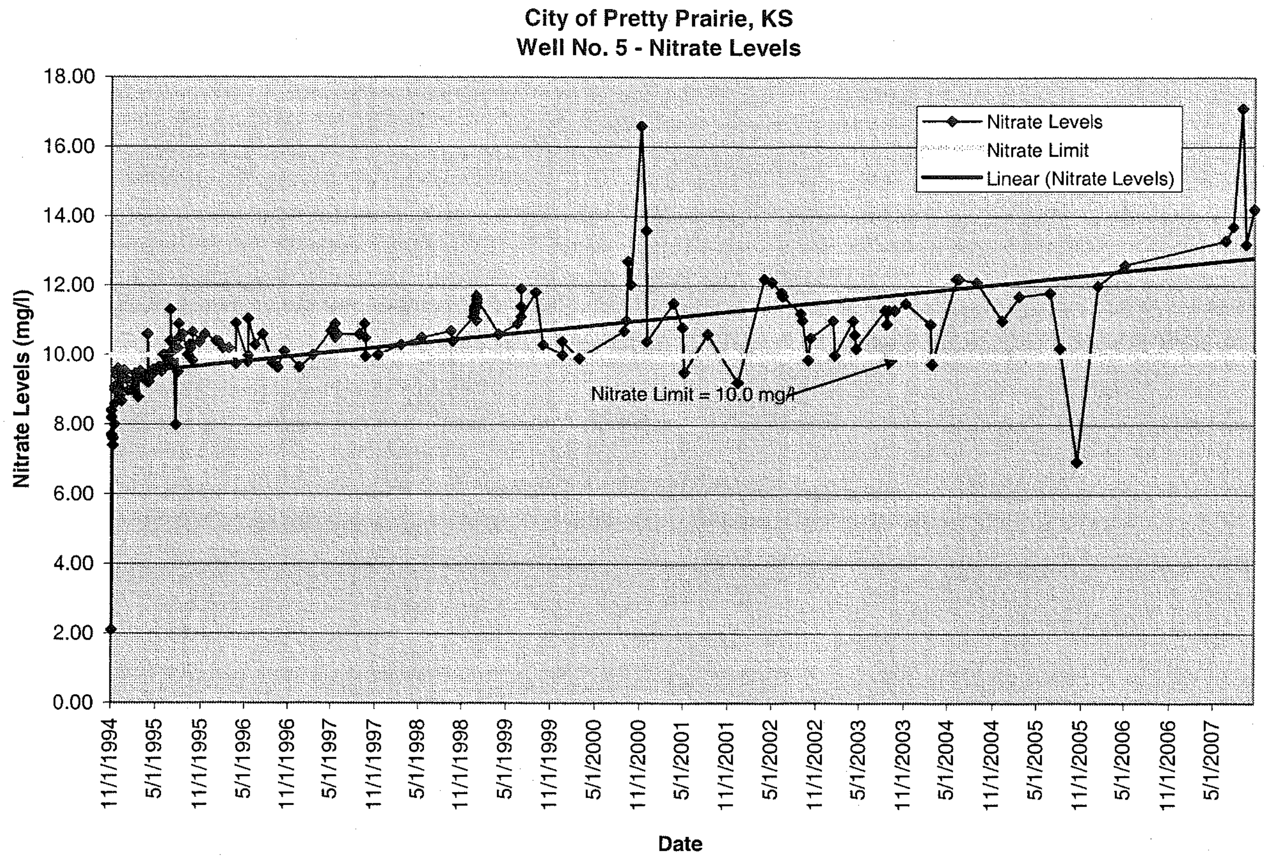
As stated the overall average nitrate levels for Well No. 5 of 10.37 mg/l is slightly above the nitrate limit of 10.00 mg/l, but refer to Table 2.3 for the annual average nitrate levels for Well No. 5 since it was brought on line. As shown the annual average has increased over time with the two highest annual averages being in 2006 and 2007.

Table 2.3 – Annual Average Nitrate Levels at Well No. 5

Year	Nitrate Level (mg/l)
1994 Average	8.35
1995 Average	9.79
1996 Average	10.19
1997 Average	10.42
1998 Average	11.13
1999 Average	10.93
2000 Average	12.12
2001 Average	10.32
2002 Average	11.30
2003 Average	10.91
2004 Average	11.36
2005 Average	10.16
2006 Average	12.30
2007 Average	14.30

It is expected that the nitrate levels in Well No. 5 will continue to increase. Refer to Figure 2.2 which shows the historical nitrate levels for Well No. 5. Over the last few years the nitrate levels have consistently been over the limit of 10.00 mg/l. Also shown in Figure 2.2 is the linear regression of the nitrate levels which shows a constantly increasing average over time.

Figure 2.2 –Nitrate Levels at Well No. 5



2.3. Nitrate Health Effects

Nitrates can be present naturally in surface and groundwater at a level that does not generally cause health problems. High levels of nitrate in well water often result from improper well construction, well location, overuse of chemical fertilizers, or improper disposal of human and animal waste. Levels of nitrate in groundwater sources can very throughout the year. Sources of nitrate that can enter your well include fertilizers, septic systems, animal feedlots, industrial waste, and food processing waste.

High levels of nitrate in drinking water are a serious health concern for infants less than six months old and pregnant women. Methemoglobinemia is a blood disorder caused by having too much nitrate in your body. This blood disorder has very visible signs and mainly effects infants. In babies less than 6 months of age, high levels of nitrate in the body will prevent the blood from delivering oxygen effectively to different parts of the body. As a result, the infant may have blueness around the mouth, hands, and feet (hence the name "blue baby syndrome"). Other signs of blue baby syndrome include vomiting and diarrhea. Pregnant women also do not tolerate nitrates very well. In women who are nursing their babies, nitrate can pass through the mother's milk to her baby and affect the baby indirectly.

To safeguard from these health effects, there is a state regulation (K.A.R. 28-15a-62) which sets the maximum contaminant level of 10 mg/l for nitrate and 1 mg/l for nitrate as the maximum allowable concentration in public drinking water supplies.

2.4. Other Contaminants

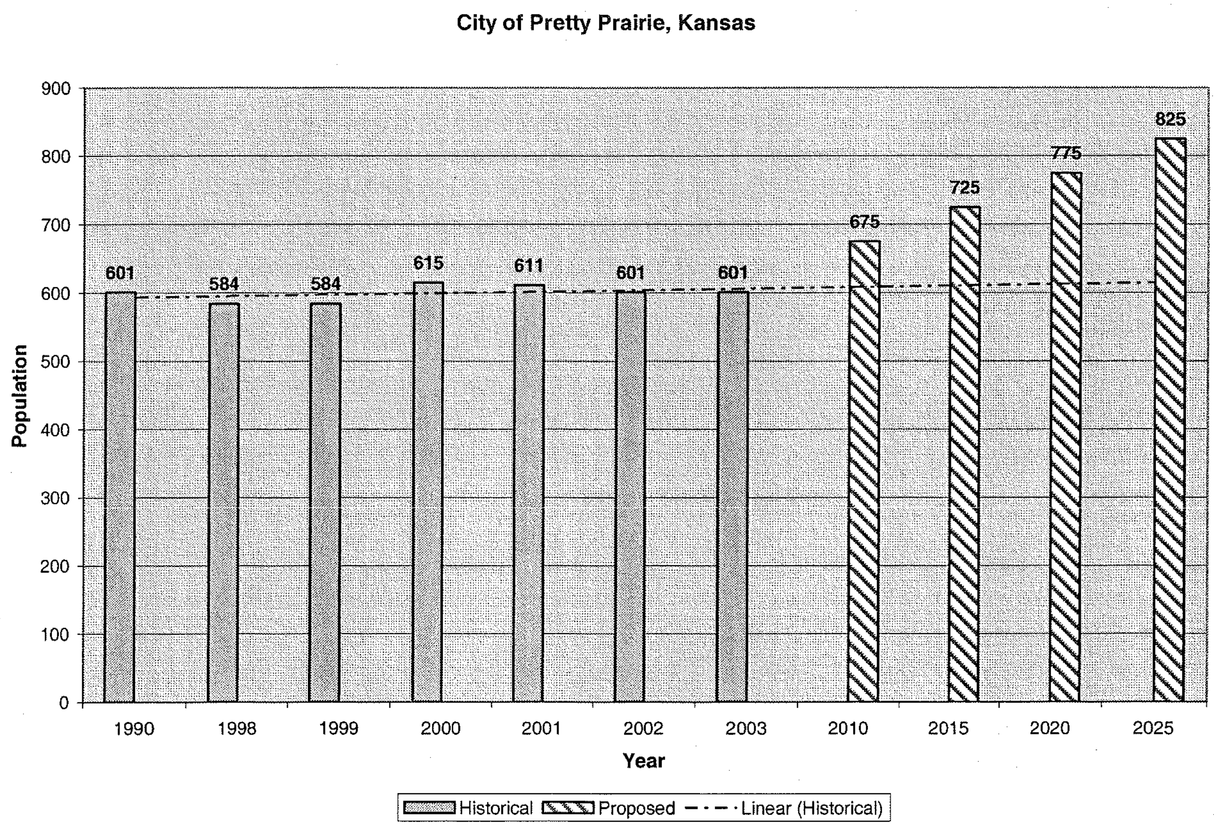
The consumer confidence reports from the last five years (see Appendix A) show that nitrate has been the only contaminant that exceeds the requirement level. This becomes advantageous and will be taken into consideration for any nitrate treatment options.

SECTION 3 – DESIGN CRITERIA

3.1. Design Period and Population

To establish design criteria for any proposed improvements, a design period and a design population must be defined. Typically, a design period of 20 years is used in estimating the required capacity of a water system. The design period determines the design year for which population predictions are made and does not represent a projected lifespan of any equipment or materials. By examining the historical population data shown in Figure 3.1, it is evident that the population of Pretty Prairie seems to be slightly increasing. By the year 2025 it is projected that the City's population will be approximately 825. For design purposes the design period of year 2027 with an estimated design population of 825 will be utilized.

Figure 3.1 – Population



3.2. Current Demand

Calculations of the current demands are based upon data presented in the municipal water use reports for 2002 – 2006 (see Appendix B). Refer to Table 3.2 for the total water demand over the last five years. This table shows that the average demand was 152 gallons per capita per day (gpcd). This means that on average, 152 gallons of water was consumed daily for each person. This per capita demand takes all industrial, residential and commercial use, along with free and unaccounted for water into account.

Table 3.2 – City Water Usage from Municipal Water Use Reports

DATE	Raw Water Diverted (gals)	Water Sold to Industrial, Stock and Bulk (gals)	Water Sold to Residential & Commercial (gals)	Metered Water Provided Free (gals)	Unaccounted for Water (gals)	Population Served	Water Sold and Free Water (gpcd)
Jan-02	2,053,000	13,000	2,839,000	26,000	-825,000	670	139
Feb-02	1,462,000	16,000	1,566,000	10,000	-130,000	670	85
Mar-02	1,955,000	19,000	1,233,000	10,000	693,000	670	61
Apr-02	2,337,000	2,000	1,965,000	66,000	304,000	670	101
May-02	13,498,000	0	2,113,000	62,000	11,323,000	670	105
Jun-02	3,427,000	20,000	2,054,000	38,000	1,315,000	670	105
Jul-02	6,215,000	25,000	3,912,000	144,000	2,134,000	670	196
Aug-02	4,067,000	0	5,312,000	236,000	-1,481,000	670	267
Sep-02	3,918,000	0	3,095,000	72,000	751,000	670	158
Oct-02	2,171,000	22,000	2,588,000	81,000	-520,000	670	130
Nov-02	1,687,000	0	0	0	1,687,000	670	0
Dec-02	1,877,000	0	3,095,000	32,000	-1,250,000	670	151
Total	44,667,000	117,000	29,772,000	777,000	14,001,000	670	

DATE	Raw Water Diverted (gals)	Water Sold to Industrial, Stock and Bulk (gals)	Water Sold to Residential & Commercial (gals)	Metered Water Provided Free (gals)	Unaccounted for Water (gals)	Population Served	Water Sold and Free Water (gpcd)
Jan-03	5,417,000	0	3,095,000	32,000	2,290,000	670	151
Feb-03	1,740,000	53,000	1,312,000	8,000	367,000	670	73
Mar-03	1,597,000	13,000	1,526,000	1,000	57,000	670	74
Apr-03	2,100,000	44,000	1,272,000	22,000	762,000	670	67
May-03	2,572,000	37,000	1,798,000	46,000	691,000	670	91
Jun-03	2,599,000	2,000	1,730,000	12,000	855,000	670	87
Jul-03	6,217,000	0	2,671,000	69,000	3,477,000	670	132
Aug-03	6,828,000	21,000	5,635,000	597,000	575,000	670	301
Sep-03	4,622,000	13,000	6,811,000	41,000	-2,243,000	670	342
Oct-03	3,390,000	4,000	1,676,000	546,000	1,164,000	670	107
Nov-03	2,208,000	0	1,895,000	37,000	276,000	670	96
Dec-03	3,092,000	18,000	2,547,000	31,000	496,000	670	84
Total	42,382,000	205,000	31,968,000	1,442,000	8,767,000	670	

DATE	Raw Water Diverted (gals)	Water Sold to Industrial, Stock and Bulk (gals)	Water Sold to Residential & Commercial (gals)	Metered Water Provided Free (gals)	Unaccounted for Water (gals)	Population Served	Water Sold and Free Water (gpcd)
Jan-04	3,092,000	18,000	2,547,000	31,000	496,000	670	125
Feb-04	1,806,000	1,000	1,684,000	19,000	102,000	670	91
Mar-04	1,809,000	2,000	1,242,000	13,000	552,000	670	61
Apr-04	2,572,000	112,000	1,835,000	24,000	601,000	670	98
May-04	2,814,000	60,000	2,000,000	52,000	702,000	670	102
Jun-04	3,209,000	13,000	3,390,000	123,000	-317,000	670	175
Jul-04	3,495,000	0	2,168,000	67,000	1,260,000	670	108
Aug-04	3,100,000	0	3,418,000	85,000	-403,000	670	169
Sep-04	4,104,000	2,000	4,937,000	13,000	-848,000	670	246
Oct-04	4,496,000	0	2,666,000	87,000	1,743,000	670	133
Nov-04	4,701,000	0	1,639,000	17,000	3,045,000	670	82
Dec-04	4,840,000	0	1,507,000	13,000	3,320,000	670	73
Total	40,038,000	208,000	29,033,000	544,000	10,253,000	670	

DATE	Raw Water Diverted (gals)	Water Sold to Industrial, Stock and Bulk (gals)	Water Sold to Residential & Commercial (gals)	Metered Water Provided Free (gals)	Unaccounted for Water (gals)	Population Served	Water Sold and Free Water (gpcd)
Jan-05	1,890,200	4,200	1,512,600	27,600	345,800	670	74
Feb-05	1,522,100	1,500	1,619,600	5,200	-104,200	670	87
Mar-05	1,859,300	0	1,362,200	25,400	471,700	670	67
Apr-05	2,226,900	0	2,061,000	47,100	118,800	670	105
May-05	3,330,000	61,600	1,868,700	56,100	1,343,600	670	96
Jun-05	3,327,800	0	2,456,000	75,500	796,300	670	126
Jul-05	4,352,000	0	3,396,300	139,100	816,600	670	170
Aug-05	3,932,200	400	4,151,200	233,400	-452,800	670	211
Sep-05	3,181,200	0	2,435,000	83,000	663,200	670	125
Oct-05	2,846,600	0	2,380,400	74,000	392,200	670	118
Nov-05	2,036,900	0	2,444,000	52,300	-459,400	670	124
Dec-05	2,006,300	12,000	1,505,900	22,400	466,000	670	74
Total	32,511,500	79,700	27,192,900	841,100	4,397,800	670	

DATE	Raw Water Diverted (gals)	Water Sold to Industrial, Stock and Bulk (gals)	Water Sold to Residential & Commercial (gals)	Metered Water Provided Free (gals)	Unaccounted for Water (gals)	Population Served	Water Sold and Free Water (gpcd)
Jan-06	1,918,300	18,400	1,608,400	21,600	269,900	670	79
Feb-06	1,782,900	7,100	1,639,100	20,900	115,800	670	89
Mar-06	2,283,100	2,300	1,815,600	40,400	424,800	670	89
Apr-06	3,263,700	3,000	2,193,400	68,100	999,200	670	113
May-06	3,151,300	0	6,141,200	63,600	-3,053,500	670	299
Jun-06	3,360,300	0	6,129,900	75,500	-2,845,100	670	309
Jul-06	5,982,400	500	10,624,500	504,200	-5,146,800	670	536
Aug-06	3,374,600	0	7,028,400	151,900	-3,805,700	670	346
Sep-06	2,976,400	0	6,069,300	151,900	-3,244,800	670	310
Oct-06	12,462,200	62,200	11,971,900	92,800	335,300	670	584
Nov-06	20,776,000	0	8,864,200	24,700	11,887,100	670	442
Dec-06	19,323,000	74,900	1,404,200	17,200	17,826,700	670	72
Total	80,654,200	168,400	65,490,100	1,232,800	13,762,900	670	

* 2006 Usage is high because of water main breaks, water tower repair, and extremely dry conditions part of the year.

MINIMUM Monthly	**0**	**0**
AVERAGE Monthly	**3,057,600**	**153**
MAXIMUM Monthly	**11,971,900**	**584**

Calculations of the current demands were checked by comparing the water use reports with water right data from the Kansas Department of Agriculture for 1994 – 2005. Refer to Table 3.3 for the total water diverted over the twelve year period. This table shows that the average demand was 151 gallons per capita day (gpcd) which checks with the current average demand calculated from the water use reports.

Table 3.3 – City Water Usage from Water Right Use Data

	From Kansas Department of Agriculture Water Right Review								
	Water Right No.41464		Water Right No. 40534		Water Right No. RN004 & 4413				
	Well #5		Well #3		Well #4				
Authorized Amt	46,290,000 gallons per year @ 500 gpm		13,700,000 gallons per year @ 280 gpm		18,000,000 gallons per year @ 450 gpm			TOTAL	
Year	(Gallons)	(gpd)	(Gallons)	(gpd)	(Gallons)	(gpd)	(Gallons)	(gpd)	(gpcd)
2005	32,082,300	87,897	0	0	429,200	1,176	32,511,500	89,073	133
2004	40,038,000	109,693	230,058	630	1,700	5	40,269,758	110,328	165
2003	36,934,400	101,190	0	0	38,800	106	36,973,200	101,296	151
2002	44,563,000	122,090	0	0	104,000	285	44,667,000	122,375	183
2001	34,936,000	95,715	0	0	10,900	30	34,946,900	95,745	143
2000	37,028,100	101,447	0	0	30,300	83	37,058,400	101,530	152
1999	31,133,300	85,297	0	0	306,000	838	31,439,300	86,135	129
1998	40,130,100	109,945	0	0	1,000	3	40,131,100	109,948	164
1997	30,981,000	84,879	0	0	74,300	204	31,055,300	85,083	127
1996	35,774,200	98,012	0	0	45,800	125	35,820,000	98,137	146
1995	34,860,300	95,508	0	0	15,600	43	34,875,900	95,550	143
1994	2,876,300	7,880	21,833,800	59,819	18,300,700	50,139	43,010,800	117,838	176
						MIN	31,055,300	85,083	127
						AVG	36,896,597	101,087	151
						MAX	44,667,000	122,375	183

Current peak demand calculations are based upon a peaking factor of 4.0. This takes into account a peak demand during a day in which demand is the highest because of hot weather and high demand such as a Saturday or Sunday when washing, showers, etc. are done simultaneously. When the current average daily demand of 152 gpcd is multiplied by 4.0, a current peak daily demand of approximately 608 gpcd is obtained.

3.3. Design Treatment Capacity

In establishing a design flow for any proposed treatment improvements, the current water demand data is taken into account with the design population that was previously defined. It is assumed that the current peak daily demand of 608 gpcd will remain constant through the design life of the new water treatment plant. The projected design criteria for any potential water treatment plant are shown in Table 3.4 and are based on current demands and the projected population discussed previously.

Table 3.4 – Current Demand and Projected Design Criteria

Current City Average Daily Demand	152 gpcd
Current City Peak Daily Demand (4.0 Peaking Factor)	608 gpcd
Projected Design Population	825
Projected City Average Daily Design Flow	125,400 gpd
Projected City Peak Daily Design Flow	501,600 gpd
Daily Hydraulic WTP Design Capacity	0.50 MGD

A capacity of 0.50 MGD is the equivalent of saying the plant will have to run at a rate of approximately 347 gpm over a 24 hour day (500,000 gpd/60 min per hour/24 hours per day = 347 gpm). On a projected average day (125,400 gpd), the plant will have to run for:

$$\left(\frac{125{,}400\,gal}{day}\right)\times\left(\frac{\min}{347\,gal}\right)\times\left(\frac{hour}{60\min}\right)=\frac{6.02\,hours}{day}$$

As shown above, the plant will only have to run for approximately six hours to supply the water demanded on an average day.

3.4. Water Rights

According to the Kansas Department of Agriculture – Division of Water Resources, the City has the water rights and permits to divert up to 60,000,000 gallons of water for use in the City of Pretty Prairie and immediate vicinity. To verify that the City has adequate water right to meet the projected design criteria established in Table 3.4, the following calculations were made:

Average Demand = 152 gpcd x 825 people = 125,400 gpd
Assume 330 days at Average Demand = 125,400 gpd x 330 days = 41,382,000 gals
Peak Demand = 608 gpcd x 825 people = 501,600 gpd
Assume 35 days at Peak Demand = 501,600 gpd x 35 days = 17,556,000 gals
TOTAL = <u>58,938,000</u> gallons per year

As shown in the calculations, total demand per year is less than the City's total water rights of 60,000,000 gallons per year therefore it is assumed that no additional water rights are needed to meet the projected design criteria. The 60,000,000 gallons is not all from Well #5 therefore any treatment alternatives need to take into consideration the City having to utilize water from Well Nos. 3, 4, and 5.

3.5. Raw Water Quality Parameters

Raw water design parameters are based on the historical data collected at the wells over the past years. Nitrate concentrations for each well are shown in Section 2 of this report. Nitrate concentrations appear to be consistently near, at, or just slightly above the maximum contaminant level of 10.0 mg/l. Most likely these nitrate levels will continue to increase over time as agricultural practices continue within the area of the existing wells. Therefore the treatment process or blending process must accommodate a higher raw water design parameter than the current average or peak concentrations. The design parameters for the raw water from the wells are depicted in Table 3.5.

Table 3.5 – Raw Water Characteristics

Raw Water Design Parameters	Concentration
Current Average Nitrate Levels	15 mg/l
Current Peak Nitrate Levels	20 mg/l
Projected Average Nitrate Levels	20 mg/l
Projected Peak Nitrate Levels	25 mg/l

3.6. Finished Water Quality Parameters

The finished water design parameters for the water treatment plant depicted in Table 3.6 are values that are one half of the maximum contaminant level (MCL) for nitrate. Using a finished water design parameter that is one half of the MCL leaves a margin of error for times when nitrate levels in the raw water are higher than anticipated. These design parameters also represent values that should be easily obtained by the water treatment equipment of reputable manufacturers.

Table 3.6 – Finished Water Characteristics

Finished Water Design Parameters	Concentration
Nitrate	5 mg/l

SECTION 4 – ALTERNATIVES

Three main alternatives will be analyzed: (1) obtain a new source of raw water with lower nitrate levels by drilling a new municipal water supply well, (2) obtain water of acceptable quality from another public water supply within close proximity, and (3) treat the existing water supply wells to reduce nitrates.

Note that boiling water does not remove nitrates and is not considered a treatment alternative. In fact, boiling the water increases nitrate concentrations as water evaporates.

4.1. Obtain New Raw Water Supply Source

The first alternative that was briefly considered was to obtain a new raw water supply source with lower nitrate levels by drilling a new municipal water supply well. As shown in Figure 2.1 the City of Pretty Prairie has utilized the east, central, and west areas surrounding the City for Well Nos. 3, 4 and 5 which have all been high in nitrates. There is a private domestic well located approximately one half mile south of Well #5 which was recently sampled and shown to have a nitrate level of 18.80 mg/l. The City's new wastewater treatment lagoon facility, which is located approximately one mile south of Well #4, has three monitoring wells installed. These monitoring wells were recently sampled and shown to have nitrate levels of 12.3 mg/l, 10.6 mg/l, and 15.7 mg/l.

The further away from the City Limits a new raw water supply source is found, the more costly this alternative becomes because of the expense of construction and maintenance of long pipeline. The City of Cheney is located approximately 25 miles southeast of Pretty Prairie and per their 2005 annual water quality report their groundwater wells have a nitrate level of 8 mg/l. The City of Conway Springs is located approximately 50 miles southeast of Pretty Prairie and per their 2006 annual water quality report their groundwater wells have a nitrate level of 12.1 mg/l.

It becomes evident with all the information given above that the groundwater in the entire area, and in and around the City of Pretty Prairie, will be high in nitrates. This makes drilling a new water supply well that is low in nitrates and therefore wouldn't require treatment not a feasible alternative.

4.2. Obtain Water from Another Public Water Supply

A second alternative that was briefly considered was to consolidate or regionalize the water supply services by obtaining water of acceptable quality from another public water supply within close proximity. The two closes sources that were considered were the City of Cheney and the City of Kingman.

The City of Cheney has a public water supply well located near Cheney Lake which is located approximately 8 miles east of the City of Pretty Prairie. The City of Pretty Prairie would have to install a new raw water supply pipeline, 8 miles in length, to connect to this water supply. Assuming a unit cost of approximately $20 per linear foot to install a new raw water supply pipeline, the total capital cost of this option is approximately $844,800. This does not include future maintenance costs that the City could incur having to maintain this 8 mile pipeline. Also, as previously mentioned the City of Cheney's nitrate levels are 8 mg/l which is fairly close to the 10 mg/l limit, meaning nitrate treatment will need to be considered by the City of Cheney in the near future.

The City of Kingman, located approximately 10 miles southwest of the City of Pretty Prairie, has public water supply wells located a few miles south of their city limits. This would mean that the City of Pretty Prairie would have to install a new raw water supply pipeline, 12 miles in length, to connect to this water supply. Assuming a unit cost of approximately $20 per linear foot to install a new raw water supply pipeline, the total capital cost of this option is approximately $1,267,200. This does not include future maintenance costs that the City could incur having to maintain this 12 mile pipeline.

Advantages of Obtaining Water from Another Public Water Supply:

- Others have the responsibility to operate and maintain proper water treatment

Disadvantages of Obtaining Water from Another Public Water Supply:

- City of Pretty Prairie would loose all water rights
- City of Pretty Prairie would most likely have higher water rates and have no control over water rate increases
- High capital cost to install necessary piping
- More than likely City of Pretty Prairie will still have to chlorinate plus operate and maintain a booster pump station

It becomes evident with all the information given above that the alternative of obtaining water from another public water supply source is not a feasible alternative.

4.3. Treat Existing Water Supply for Nitrate Removal

The last alternative considered is to treat the existing water supply to reduce the nitrate levels. This treatment can be done in the following ways: blending of the existing water supply wells, installation of individual household reverse osmosis units, or installation of a centralized nitrate treatment plant.

4.3.1. Blend Water Supply Wells

One alternative to reducing nitrate levels in the raw water is to blend the existing water supply wells. Knowing that all the City's existing wells are high in nitrates and the high probability that any new well will be high in nitrates, this alternative was only briefly considered.

According to the nitrate levels at the existing wells, even if a new low nitrate well(s) could be located it will need to be continuously very low in nitrates (approximately 6 mg/l) and then only the blended water supply scenario of Well No. 5 and the New Well on would meet the nitrate limit of 10 mg/l. Table 4.1 shows various blending scenarios and the combined nitrate concentrations for each scenario, assuming one new well could be installed with a flow rate of 350 gpm and a nitrate level of 6 mg/l.

Table 4.1 – Well Blending Scenarios

	Flow Rate= Avg Nitrate Conc=	Well No. 3 200 gpm 18.35 mg/L	Well No. 4 300 gpm 14.79 mg/L	Well No. 5 350 gpm 10.37 mg/L	New Well 350 gpm 6.00 mg/L	Total Flow (gpm)	Blended Nitrate Levels (mg/L)
2 Wells On	Scenario No. 1	x	x			500	16.21
	Scenario No. 2	x		x		550	13.27
	Scenario No. 3	x			x	550	10.49
	Scenario No. 4		x	x		650	12.41
	Scenario No. 5		x		x	650	10.06
	Scenario No. 6			x	x	700	8.19
						Minimum	**8.19**
						Average	**11.77**
						Maximum	**16.21**

X = that well is on

Based on Table 4.1 blending the existing wells will not reduce the nitrate levels below the 10 mg/l limit. Also, installing a low nitrate well, which as mentioned previously will be tough to find in this area, and blending the new well with the existing wells will only slightly reduce nitrate levels. Consistently staying below the nitrate limit of 10 mg/l will still most likely be an issue, especially if nitrate levels are found to be above 6 mg/l at the new well or if the nitrate levels in the new well and/or the existing wells increase over time.

It becomes evident with all the information given above that the alternative of blending water supply wells is not a feasible alternative.

4.3.2. Install Individual Household Treatment Units

One alternative to reducing nitrate levels in the raw water is to install individual household treatment units. In some cases it may be more cost-effective for small public water systems to utilize point-of-entry (POE) treatment devices rather than construct a centralized treatment plant. While central treatment plants treat all water distributed to consumers, POE treatment devices are designed to treat all water entering a single home, business, school, or facility.

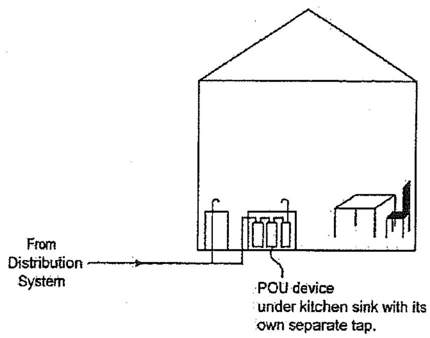


Figure 4.1 – Point of Use (POU) schematic

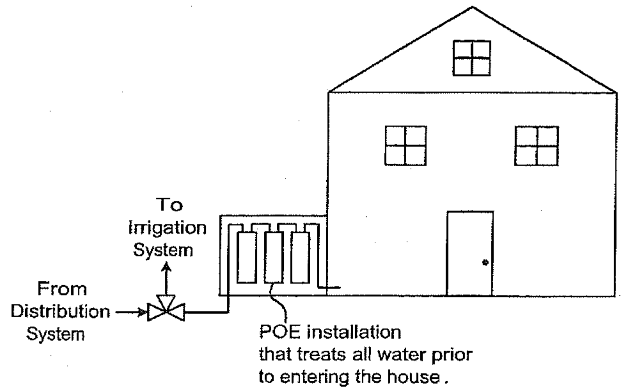


Figure 4.2 – Point of Entry (POE) schematic

Point-of-use (POU) treatment devices are designed to treat only the water intended for direct consumption (drinking and cooking) typically at a single tap or limited number of taps. Because POU devices do not treat all the water taps in a house, there is a potential health risk to household residents who consume untreated water. Therefore, POU devices are not advised for nitrate treatment.

Even though implementing a POE treatment system may be substantially less expensive than a central treatment plant, systems should understand both capital and operation & maintenance costs associated with POE treatment devices.

Advantages of Installing Individual Household Treatment Units:

- Lower capital cost

Disadvantages of Installing Individual Household Treatment Units:

- Public water system (PWS) must obtain state approval for utilizing POE devices for nitrate treatment
- A pilot study will be required to verify the POE unit can effectively treat the water
- POE units must be owned, controlled, and maintained by the PWS or a contractor hired by the PWS to ensure proper operation and maintenance of the devices and compliance with contaminant levels
- PWS must develop and obtain state approval for a monitoring plan before POE devices are installed
- Public education on the POE units must be completed prior to installation and most likely be on-going
- POE units must have mechanical warnings to automatically notify customers of operational problems.

- Ordinances and agreements will be necessary to establish ownership and maintenance of the units and access to the units
- POE units will have to be installed inside to prevent damage from freezing. This could pose a problem for some customers who may not have adequate space in their homes or businesses for a POE device
- Liability concerns with entering a private residence
- Liability concerns with failure of the device that results in water that exceeds a contaminant level
- Liability concerns with property damage that occurs during installation or as a result of a malfunctioning unit

It becomes evident with all the information given above that the alternative of installing individual household treatment units may be the most cost-effective alternative when it comes to capital cost but with all the issues of liability, operation & maintenance, monitoring, public education, etc. it may not be the most feasible and long-term alternative for the City.

4.3.3. Install Centralized Nitrate Treatment Plant

A central treatment plant is designed to treat all water distributed to consumers. Typically all raw water supply is diverted to one central location where all the raw water can then be easily and efficiently treated at a main treatment facility. Operation and maintenance costs are decreased compared to installing POE units due to the fact that operators only have one location and one main treatment skid to tend to.

Nitrate ions are not easily filtered. The US Environmental Protection Agency (EPA) has recognized only three approved water treatment processes for the removal of nitrates. These treatment techniques include Ion Exchange, Reverse Osmosis (RO) and Electrodialysis Reversal (EDR). Each of these treatment processes are discussed in detail below.

***Ion Exchange*:**
Ion exchange is a water treatment method in which one or more contaminants are removed from water by exchange with a less harmful substance. In the case of nitrate removal, chloride typically takes the place of the nitrate ion.

To make this exchange possible, water is passed through a tightly packed anion exchange resin bed. As the water flows through the bed, nitrate ions are picked up by the resin and exchanged with chloride ions which reside on the resin.

When the resin is fully loaded with nitrate ions, it can be regenerated with a sodium chloride (brine) backwash solution. After regeneration, the resin can be placed back into service. The brine backwash solution, which is high in nitrates, must be sent to the municipal sewer system for treatment and disposal.

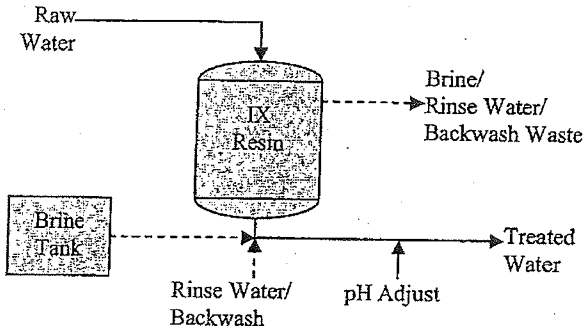


Figure 4.3 – Ion exchange process schematic

Advantages of the Ion Exchange process include:
- Most effective and most efficient; widely used
- Ease of operation; highly reliable
- Lower initial cost
- Media bed can be reused multiple times after recharge
- Pressure vessel process does not consume power to operate
- Suitable for small and large installations
- High efficiency means smaller amount of waste

Disadvantages of the Ion Exchange process include:
- Does not completely eliminate all nitrates
- Selective process (only removes the nitrate anion)
- Requires frequent monitoring for nitrate removal
- Requires salt storage
- Strongly basic anion resins are susceptible to organic fouling
- Waste stream is a heavily concentrated brine solution that may disrupt wastewater treatment operations

***Reverse Osmosis (RO)*:**
Reverse Osmosis (RO) is a physical water treatment process which uses pressure to force water through a semi-permeable membrane that retains contaminants on one side and allows "clean" water to pass to the other side.

The impurities, or contaminants, will be continually flushed away from the membrane via a separate waste stream. This waste stream must dispose of the contaminants in a manner that is ecologically friendly and within the regulations of KDHE. The three manners of which to do so include pumping the waste stream to the municipal sewer system for treatment and disposal, into a deep injection well, or to the nearest body of water, which will require a National Pollutant Discharge Elimination System (NPDES) Permit. All these waste disposal options have been used in the State of Kansas and require different design parameters. An RO pilot study will need to be performed to determine the contamination level of the waste stream before determining where to dispose of the waste. After time, the semi-permeable membrane becomes fully loaded with contaminant and can no longer pass water. At this time, the membrane must be replaced.

An RO treatment system may require pre-treatment due to any high levels of other contaminants such as iron and total dissolved solids (TDS) which can foul, scale, or degrade the membrane. According to recent water analysis, the City of Pretty Prairie does not have high levels of iron and TDS. The pre-treatment may include a pressure vessel filter with absorption media that will remove the iron prior to the RO treatment process. There may also be chemical addition to bring the water quality to a level that will allow the RO membranes to last longer. This chemical treatment may include an acid feed system as well as an anti-scaling feed system.

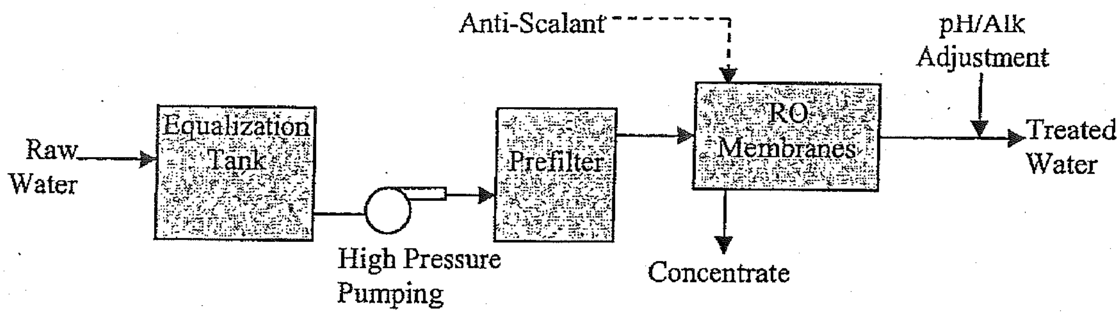


Figure 4.2 – Reverse osmosis process schematic

Advantages of the RO process include:

- Produces highest water quality
- Can effectively treat wide range of contaminants

Disadvantages of the RO process include:

- High capital costs
- Consumes power during operation – High operational costs
- Very inefficient process (system only 50 to 75% efficient) – High amount of waste
- Requires pressures of 150 – 400 psi
- Frequent membrane monitoring and maintenance
- Pressure, temperature, and pH requirements to meet membrane tolerances.
- Pre-treatment of water may be necessary to reduce fouling of membrane
- Membranes are relatively expensive
- Highly concentrated waste stream requires proper disposal

***Electrodialysis Reversal (EDR)*:**

The Electrodialysis Reversal (EDR) process utilizes electricity to induce movement of anions across a membrane to separate nitrates, as well as other ions from the water stream. Ions are transferred through ion exchange membranes by means of direct current voltage, and are removed from the feed water stream as the electrical current drives the ions through the

membranes. In doing so, the EDR technology maintains a high efficiency of 85 to 95% water recovery.
The waste stream from the EDR process is highly concentrated and must be disposed of in a manner that is ecologically friendly and within the regulations of KDHE.

An EDR treatment system may require pre-treatment due to any high levels of other contaminants such as iron and total dissolved solids (TDS). The pre-treatment may include a three-to-four vessel pressure filter with absorption media that will remove the iron prior to the EDR treatment process. There may also be chemical addition to bring the water quality to a level that will allow the EDR membranes to last longer. This chemical treatment may include an acid feed system as well as an anti-scaling feed system.

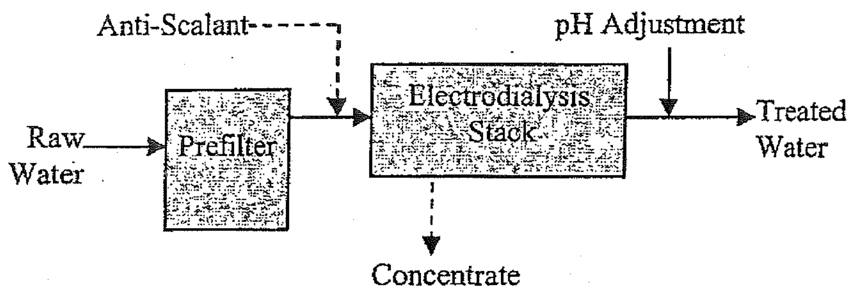


Figure 4.4 – Electrodialysis process schematic

Advantages of the electrodialysis reversal process include:

- Can operate with minimal fouling or scaling, or chemical addition; suitable for higher TDS sources
- Low pressure requirements; typically quieter than RO
- Long membrane life expectancy; reduces membrane maintenance
- Very "clean" effluent water after treatment process
- Process not selective for nitrate removal
- High water recovery rate (85 - 95%)

Disadvantages of the electrodialysis reversal process include:

- High capital costs
- Consumes power during operation – High operational costs
- Cannot remove nonionic dissolved species or microbes
- Not suitable for high levels of iron and manganese, hydrogen sulfide, chlorine, or hardness
- Limited to water with 3,000 mg/l TDS or less

Table 4.1 – Summary of Nitrate Treatment Alternatives

	Treatment Process		
	Ion Exchange	**Reverse Osmosis**	**Electrodialysis**
Kansas Installations	Many	Few	One
Raw Water Issues	Resin sensitive to iron, manganese, sulfate, organic matter, and TDS	Process sensitive to iron, manganese, organic matter, TDS, and turbidity	Membrane sensitive to iron, manganese, organic matter, and turbidity
Pretreatment Required	Sometimes	Significant	Sometimes
Efficiency	Very Good	Poor	Average
Post Treatment	pH adjustment may be required	Low TDS may require water quality adjustments	None
Waste Disposal	Salt brine and rinse water; Small amount of waste	Concentrate; Large amount of waste	Concentrate
Operation & Maintenance	Simple	Difficult	Difficult
Capital Cost	Low	Moderate	Very High
O&M Costs	Low	Highest	High

It becomes evident with all the information given on a central nitrate treatment plant that a new ion exchange treatment plant is the best long-term and most cost effective alternative to lowering the nitrate levels. Refer to Appendix C for information on three manufacturer's ion exchange processes (Layne Christensen, Hungerford & Terry, and Calgon).

SECTION 5 – OPINION OF PROBABLE COSTS

5.1. Cost Estimates

Tables 5.1, 5.2, and 5.3 depict the Opinion of Probable Construction Cost for capital costs and annual operation and maintenance (O&M) costs for each alternative.

Table 5.1 – Opinion of Probable Cost for Alternative No. 1: Install New Municipal Supply Well (2007 Dollars)

Description	Estimated Quantity	Unit	Unit Price	Extension
Mobilization	1	L.S.	$10,000.00	$10,000
Construction Staking	1	L.S.	$10,000.00	$10,000
New Pitless Well, Complete	1	L.S.	$90,000.00	$90,000
Check Valve Pit, Complete	1	L.S.	$5,000.00	$5,000
Flow Meter Pit, Complete	1	L.S.	$7,500.00	$7,500
Electrical Site Work	1	L.S.	$10,000.00	$10,000
Water Pipeline, 8"	5,280	L.F.	$20.00	$105,600
Seeding	1	L.S.	$5,000.00	$5,000
			SUBTOTAL	$243,100
Construction Contingency (15%)				$36,465
			TOTAL Estimated Construction Cost	$279,565
Engineering, Legal, Admin., etc. (15%)				$41,935
			TOTAL Estimated Project Cost	**$321,500**

* Does not include any land or easement costs

Description	Estimated Quantity	Unit	Unit Price	Extension
Electricity	1	L.S.	$6,000.00	$6,000
Sampling & Monitoring	1	L.S.	$5,000.00	$5,000
Miscellaneous	1	L.S.	$5,000.00	$5,000
			TOTAL Estimated Annual O&M Costs	**$16,000**

Table 5.2 – Opinion of Probable Cost for Alternative No. 2: Obtain Water from Another Public Water Supply (2007 Dollars)

Description	Estimated Quantity	Unit	Unit Price	Extension
Mobilization	1	L.S.	$10,000.00	$10,000
Construction Staking	1	L.S.	$10,000.00	$10,000
Water Pipeline, 8"	42,240	L.F.	$20.00	$844,800
Miscellaneous Fittings & Bends	1	L.S.	$10,000.00	$10,000
Seeding	1	L.S.	$10,000.00	$10,000
			SUBTOTAL	$884,800
Construction Contingency (15%)				$132,720
			TOTAL Estimated Construction Cost	$1,017,520
Engineering, Legal, Admin., etc. (15%)				$152,628
			TOTAL Estimated Project Cost	**$1,170,148.00**

* Does not include any land or easement costs

Description	Estimated Quantity	Unit	Unit Price	Extension
Sampling & Monitoring	1	L.S.	$5,000.00	$5,000
Miscellaneous	1	L.S.	$5,000.00	$5,000
			TOTAL Estimated Annual O&M Costs	**$10,000**

Table 5.3a – Opinion of Probable Cost for Alternative No. 3a: Blend Water Supply Wells (2007 Dollars)

[Costs are purposely not given for this alternative as it is not considered a feasible alternative given the nitrate levels of the existing wells.]

Table 5.3b – Opinion of Probable Cost for Alternative No. 3b: Install Individual Household Treatment Units (2007 Dollars)

Description	Estimated Quantity	Unit	Unit Price	Extension
Individual Reverse Osmosis Units	320	Ea.	$2,000.00	$640,000
Installation of Reverse Osmosis Units	320	Ea.	$250.00	$80,000
Monitoring/Sampling	320	Ea.	$50.00	$16,000
Miscellaneous Household Piping Improvements	1	L.S.	$5,000.00	$5,000
			SUBTOTAL	$741,000
Construction Contingency (15%)				$111,150
			TOTAL Estimated Construction Cost	$852,150
Engineering, Legal, Admin., etc. (5%)				$42,608
			TOTAL Estimated Project Cost	**$894,758**

Description	Estimated Quantity	Unit	Unit Price	Extension
Annual Operation and Maintenance	320	Ea.	$75.00	$24,000
Electricity for Units	320	Ea.	$60.00	$19,200
Sampling & Monitoring	320	Ea.	$50.00	$16,000
Miscellaneous	1	L.S.	$5,000.00	$5,000
			TOTAL Estimated Annual O&M Costs	**$64,200**

Table 5.3c – Opinion of Probable Cost for Alternative No. 3c: Construct Central Ion Exchange Nitrate Treatment Plant (2007 Dollars)

Description	Estimated Quantity	Unit	Unit Price	Extension
Mobilization	1	L.S.	$20,000.00	$20,000
Construction Staking	1	L.S.	$5,000.00	$5,000
Water Pipeline, 8"	500	L.F.	$40.00	$20,000
Miscellaneous Fittings & Bends	1	L.S.	$5,000.00	$5,000
Water Treatment Plant Building, Complete (50' x 30')	1,500	S.F	$135.00	$202,500
Water Treatment Equipment**, Complete	1	L.S.	$475,000.00	$475,000
Booster Pump Skid, Complete	1	L.S.	$40,000.00	$40,000
Plant Piping and Appurtenances	1	L.S.	$25,000.00	$25,000
Site Grading	1	L.S.	$5,000.00	$5,000
Site Electrical	1	L.S.	$10,000.00	$10,000
Backup Generator	1	L.S.	$100,000.00	$100,000
Telemetry	1	L.S.	$20,000.00	$20,000
Sidewalks, Drives, and Other Surfacing	1	L.S.	$2,500.00	$2,500
Seeding	1	L.S.	$2,500.00	$2,500
			SUBTOTAL	$932,500
Construction Contingency (15%)				$139,875
			TOTAL Estimated Construction Cost	$1,072,375
Engineering, Legal, Admin., etc. (15%)				$160,856
			TOTAL Estimated Project Cost	**$1,233,231**

* Does not include any land or easement costs

** Utilized the equipment budget from Layne which was the lowest

Description	Estimated Quantity	Unit	Unit Price	Extension
Chemical/Salt Costs	1	L.S.	$17,500.00	$17,500
Electricity	1	L.S.	$6,000.00	$6,000
Sampling & Monitoring	1	L.S.	$5,000.00	$5,000
Miscellaneous	1	L.S.	$5,000.00	$5,000
			TOTAL Estimated Annual O&M Costs	**$33,500**

5.2. Summary

Table 5.4 is a summary of the capital costs and annual operation and maintenance costs for each alternative.

Table 5.4 – Summary of Opinion of Probable Cost for Each Alternative (2007 Dollars)

Description	Total Capital Cost	Annualized Capital Costs*	Annualized O&M Costs	TOTAL Annualized Costs
Alternative 1: Install New Municipal Water Supply Well	$ 321,500	$ 23,662	$ 16,000	$ 39,662
Alternative 2: Obtain Water from Another Public Water Supply	$ 1,170,148	$ 86,123	$ 10,000	$ 96,123
Alternative 3a: Blend Water Supply Wells	Not Feasible Option			
Alternative 3b: Install Individual Household Treatment Units	$ 894,758	$ 65,854	$ 64,200	$ 130,054
Alternative 3c: Construct Central Ion Exchange Nitrate Treatment Plant	$ 1,233,231	$ 90,766	$ 33,500	$ 124,266

* Assumed 4% interest over 20 years

SECTION 6 – RECOMMENDATIONS

6.1. Recommendations

Based on the three alternatives of (1) obtain a new source of raw water with lower nitrate levels by drilling a new municipal supply well, (2) obtain water of acceptable quality from another public water supply within close proximity, and (3) treat the existing water supply wells to reduce nitrates, it is recommended that the City proceed with the third alternative. This alternative is not the most cost effective but does provide the City with the best long term nitrate treatment solution. Based on the advantages and disadvantages of each treatment alternative, it is recommended that the City construct a central treatment plant and utilize the ion exchange process for nitrate treatment (Alternative 3c).

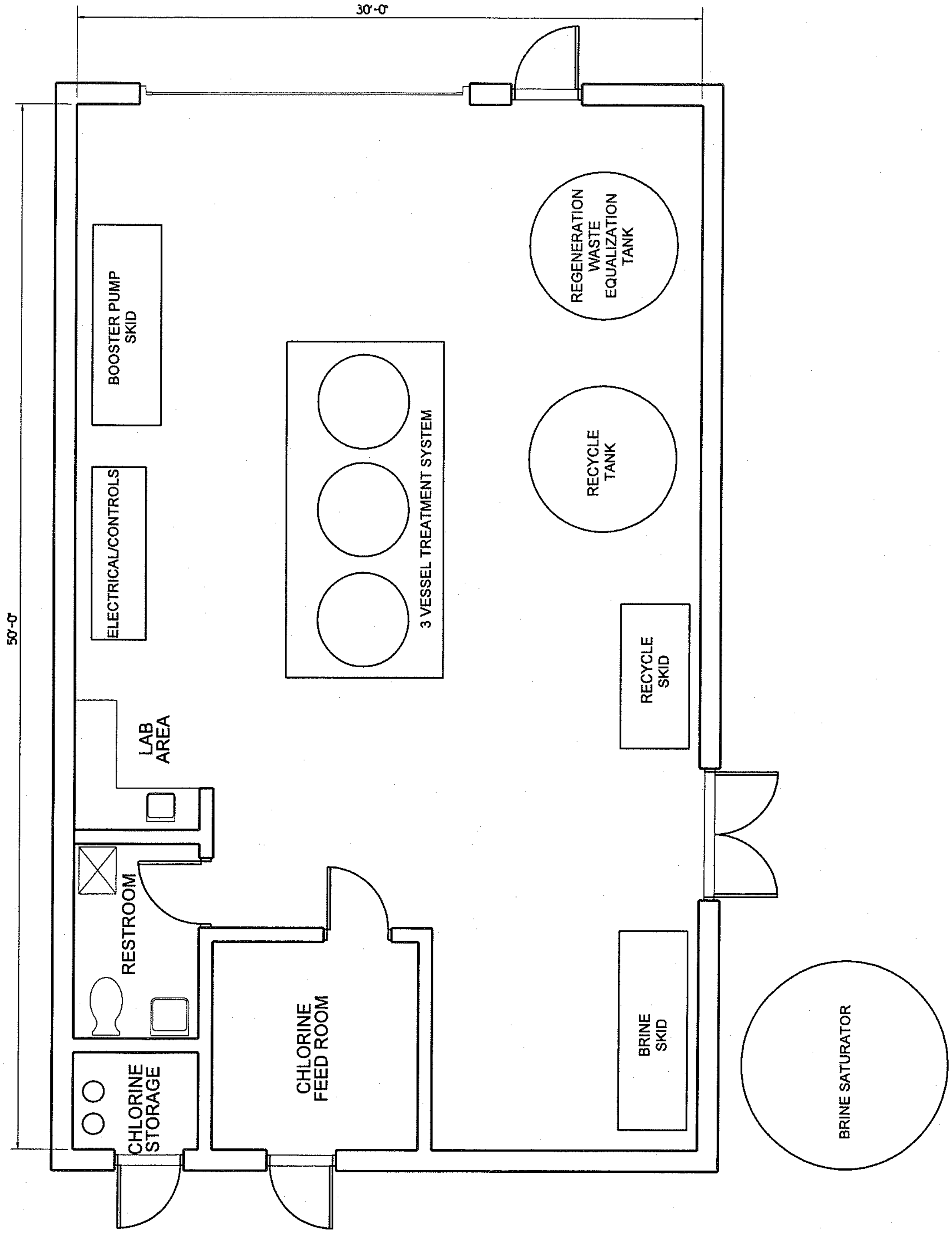
Table 6.1 is a summary of the capital costs and annual operation and maintenance costs for the recommended alternative.

Table 6.1 – Summary of Opinion of Probable Cost for Recommended Alternative (2007 Dollars)

Description	Total Capital Cost	Annualized Capital Costs*	Annualized O&M Costs	TOTAL Annualized Costs
Alternative 3c: Construct Central Ion Exchange Nitrate Treatment Plant	$ 1,233,231	$ 90,766	$ 33,500	$ 124,266
TOTAL PROJECT	$ 1,233,231	$ 90,766	$ 33,500	$ 124,266

* Assumed 4% interest over 20 years

Refer to Figure 6.1 for a preliminary layout for the nitrate treatment plant which utilizes a pressure vessel ion exchange process for treatment.



WATER TREATMENT PLANT BUILDING - FLOOR PLAN
SCALE: 1/8" = 1'-0"

WILSON & COMPANY

CITY OF PRETTY PRAIRIE, KANSAS
WATER SYSTEM FEASIBLITY STUDY

FIGURE 6.1
WATER TREATMENT PLANT LAYOUT

DSGN. MDS	DR. MDS	CK. JMS
FILE 07-200-523-00	DATE DEC 2007	FIGURE NO. 6.1

SECTION 7 – WATER RATE ANALYSIS

7.1. INTRODUCTION

This section provides an estimate of the total probable project costs and includes a discussion of potential funding sources available for the proposed water system improvements. This section also presents an analysis of the City's current water rate and makes recommendations regarding water rate adjustments necessary to fund the proposed improvements.

7.2. PROBABLE COSTS FOR RECOMMENDED IMPROVEMENTS

The following is a summary of the total probable project costs for construction of a central ion exchange nitrate treatment plant.

Description	Total Capital Cost	Annual O&M Costs
Alternative 3c: Construct Central Ion Exchange Nitrate Treatment Plant	$ 1,233,231	$ 33,500

7.3. FINANCING

While several options for financing water system improvements are available, perhaps the most readily available funding source is the Kansas Public Water Supply Revolving Loan Fund, also know as the State Revolving Loan Fund (SRLF). The Kansas Department of Health and Environment (KDHE) administers this loan program that provides water improvement loans for low interest and for long terms without requiring matching funds form the City. The current loan rate is approximately 3.63 (November 2007) percent over a 20-year repayment period.

Other potential funding sources include, but are not limited to, Community Development Block Grants (CDBG) as administered by the Kansas Department of Commerce and Housing (KDOCH), grant/loan programs through the United States Department of Agriculture – Rural Development (USDA-RD), general obligation bonds, revenue bonds or sales tax revenue.

Communities seeking CDBG funding compete with each other by applying to the State for the federally funded monies. The monies are awarded to various communities based on how they meet certain criteria (project need, project readiness, etc.). The competition involves, among other things, that the community must meet a LMI (Low to Moderate Income) level. The City must complete a survey to verify if this percentage has increased to the required 51%. Few projects are now funded without a dollar for dollar match and CDBG grant funds are limited to $400,000 maximum.

USDA-RD provides loans and grants to municipalities with a population of 10,000 or less and which are unable to finance their needs from their own resources. Grant funds are limited to applicants serving areas with a median household income (MHI) of less than the statewide non-metropolitan MHI. USDA-RD grants cannot exceed 75% of project costs and are limited to the amount necessary to result in a reasonable threshold water rate. The current threshold water rate is $35 for 5,000 gallons of water. USDA-RD loans can be obtained for maximum terms up to 40 years. Typically it is not a good option to take a loan out for this amount of time because more than likely future improvements to the water system may be necessary in the next 40 years.

General obligation and revenue bonds are a type of municipal government bond, which is government debt issued to raise money to finance public improvements. A general obligation bond is a municipal bond backed by the credit and "taxing power" of the issuing jurisdiction, rather than the revenue from a given project. No assets are used as collateral for the bond and the bond is not dependent on revenue of any particular project for repayment. A revenue bond is a bond payable solely from net or gross non-tax revenues derived from charges paid by users of the facilities constructed with the proceeds of the bond issue.

An increase in sales tax can also provide revenue to fund a water improvement project. This is where a stipulated amount of sales tax increase (i.e. one cent) on goods/services purchased inside the City for a stipulated amount of years creates additional revenue. All revenue from that sales tax increase is then utilized to fund the water improvement project. Typically a sales tax increase requires a strict voting process.

Often, a combination of funding sources is secured for projects. Typically, communities are using the Revolving Loan Fund as the match amount for a CDBG grant or just utilizing the Revolving Loan Fund and making repayments by additional revenue created from a water rate increase.

7.4. WATER RATE ANALYSIS

7.4.1. Current Water Rate

The City of Pretty Prairie's current monthly water rate is as follows:

- $13.00 minimum service charge (inside the City)
- $13.00 minimum service charge (outside the City limits)
- $0.80 per 100 cubic feet (inside the City)
- $1.60 per 100 cubic feet (outside the City limits)

This equates to $18.60 (inside the City) for 700 cubic feet which is approximately 5,000 gallons. The current state average water rate for 5,000 gallons is $20.43.

7.4.2. Number of Water Connections

Table 7.1 includes all active water connections from the water use reports.

Table 7.1 – Number of Active Water Connections

Year	No. of Connections
1999	306
2000	308
2001	313
2002	313
2003	315
2004	315
2005	317
2006	317

Overall, the number of connections seems to be fairly consistent with a slight increase over the past several years. All rate calculations within this report will be based on 320 connections.

7.4.3. Water Utility Fund Expenditures and Revenues

A copy of the Water Utility Fund budgets from 2000 to 2008 is included in Appendix D. Table 7.2 includes the total expenditures and revenue for the Water Utility Fund for the years of 2002 to 2006:

Table 7.2 – Total Revenue and Expenditures of the Water Utility Fund

Year	Total Revenue	Total Expenditures	Transfer to Water/Sewer Reserve Fund	Balance
2000	$72,717	$40,705	$32,012	$0
2001	$77,247	$53,660	$23,587	$0
2002	$74,078	$44,200	$29,878	$0
2003	$81,559	$38,548	$43,011	$0
2004	$73,848	$42,456	$31,392	$0
2005	$76,901	$38,586	$38,315	$0
2006	$83,869	$63,627	$20,242	$0
2007 (Estimated)	$86,800	$56,600	$30,200	$0
2008 (Budgeted)	$91,850	$56,600	$35,250	$0
		Total	$283,887	
		Average	$31,534	Balance = ?

As indicated in this table, the City is experiencing an average surplus of approximately $31,500 annually in the water utility fund, based on the current monthly water rate. This surplus is transferred to a Water/Sewer Reserve Fund which that accumulates monthly and is used for capital improvements and maintenance for both the water and sewer systems. Therefore, the additional revenue created by any water rate increase above the current monthly rate can be applied entirely to debt service for the proposed water system improvements, along with possibly utilizing some of the annual surplus for annual debt service or to decrease the total project cost with an upfront payment from surplus reserves accumulated to date.

7.4.4. Proposed Water Rate Increase

Based on the probable project costs for the water treatment improvements identified at the beginning of this section and the calculated annual debt service, the proposed water rate increase was calculated based on the same four scenarios: (1) the amount funded in part by CDBG grant and the rest with KDHE loan program, (2) the amount funded in part by CDBG grant and the rest with USDA-RD loan program, (3) the entire amount funded by the KDHE loan program, and (4) the entire amount funded by the USDA-RD loan program.

It is recommended that any increase in water rate be applied to the minimum charge as opposed to the additional usage rate. Any increase to the minimum charge will create definite and reliable additional revenue whereas an increase to the additional usage rate is neither definite nor reliable since users could start to conserve water to decrease their monthly bill.

Option 1 CDBG Grant and KDHE Loan:

Total Probable Project Cost	$1,233,231.00	
Funds from Water/Sewer Reserve Fund	$0.00	< Need City Input
Proposed CDBG Grant Amount	$400,000.00	
KDHE Loan Amount	$833,231.00	
Cost Factor	0.0736	(i = 4% over 20 years)
Annual Debt Service	$61,326.00	
Annual O&M Costs	$33,500.00	
Annual Revenue Surplus in Water Budget	$30,000.00	< Need City Input
Additional Revenue Required	$64,826.00	
Total Connections	320	
Annual Cost per Connection	$202.58	
Monthly Cost per Connection	$16.88	
Recommended Monthly Water Rate Increase	**$16.90**	

Option 2 CDBG Grant and USDA-RD Loan:		
Total Probable Project Cost	$1,233,231.00	
Funds from Water/Sewer Reserve Fund	$0.00	< Need City Input
Proposed CDBG Grant Amount	$400,000.00	
KDHE Loan Amount	$833,231.00	
Cost Factor	0.0534	(i = 4.375% over 40 years)
Annual Debt Service	$44,478.00	
Annual O&M Costs	$33,500.00	
Annual Revenue Surplus in Water Budget	$30,000.00	< Need City Input
Additional Revenue Required	$47,978.00	
Total Connections	320	
Annual Cost per Connection	$149.93	
Monthly Cost per Connection	$12.49	
Recommended Monthly Water Rate Increase	**$12.50**	

Option 3 KDHE Loan:	(Do NOT include land costs)	
Total Probable Project Cost	$1,233,231.00	
Funds from Water/Sewer Reserve Fund	$0.00	< Need City Input
KDHE Loan Amount	$1,233,231.00	
Cost Factor	0.0736	(i = 4% over 20 years)
Annual Debt Service	$90,766.00	
Annual O&M Costs	$33,500.00	
Annual Revenue Surplus in Water Budget	$30,000.00	< Need City Input
Additional Revenue Required	$94,266.00	
Total Connections	320	
Annual Cost per Connection	$294.58	
Monthly Cost per Connection	$24.55	
Recommended Monthly Water Rate Increase	**$24.55**	

Option 4 *USDA-RD Loan:*

Total Probable Project Cost	$1,233,231.00	
Funds from Water/Sewer Reserve Fund	$0.00	< Need City Input
KDHE Loan Amount	$1,233,231.00	
Cost Factor	0.0534	(i = 4.375% over 40 years)
Annual Debt Service	$65,830.00	
Annual O&M Costs	$33,500.00	
Annual Revenue Surplus in Water Budget	$30,000.00	< Need City Input
Additional Revenue Required	$69,330.00	
Total Connections	320	
Annual Cost per Connection	$216.66	
Monthly Cost per Connection	$18.05	
Recommended Monthly Water Rate Increase	**$18.05**	

7.4.5. *Water Rate Comparison*

Based on the proposed water rate increases, the following would be the proposed monthly water rates for each funding option:

Option 1: CDBG Grant and KDHE Loan:
- $29.90 ($13.00 + $16.90) minimum service charge (inside the City)
- $0.80 per 100 cubic feet (inside the City)
- = $35.50 for 700 cubic feet (~5,000 gallons)

Option 2: CDBG Grant and USDA-RD Loan:
- $25.50 ($13.00 + $12.50) minimum service charge (inside the City)
- $0.80 per 100 cubic feet (inside the City)
- = $30.35 for 700 cubic feet (~5,000 gallons)

Option 3: KDHE Loan:
- $37.55 ($13.00 + $24.55) minimum service charge (inside the City)
- $0.80 per 100 cubic feet (inside the City)
- = $43.15 for 700 cubic feet (~5,000 gallons)

Option 4: USDA-RD Loan:
- $31.05 ($13.00 + $18.05)minimum service charge (inside the City)
- $0.80 per 100 cubic feet (inside the City)
- = $36.65 for 700 cubic feet (~5,000 gallons)

As stated previously, the current state average water rate for cities is $20.43 which includes 5,000 gallons or approximately 700 cubic feet of water usage. The following is a listing of water rates for some Kansas communities that have completed recent water system improvements based on the most recent information available:

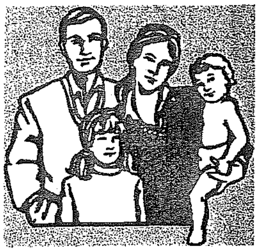
Ransom – New Water Distribution System (Population 292):	$31.50 for 5,000 gallons
Downs – Nitrate Removal Improvements (Population 1,017):	$32.00 for 5,000 gallons
Colwich – New Water Distribution System (Population 1,256): – Also uses P-tax	$37.50 for 5,000 gallons
Minneapolis – Iron & Manganese Removal Improvements (Population 2,054):	$37.78 for 5,000 gallons
Russell – New EDR System (Population 4,342):	$40.75 for 5,000 gallons
Ellis – Iron & Manganese Removal Improvements (Population 1,850):	$45.95 for 5,000 gallons

APPENDIX A

CONSUMER CONFIDENCE REPORTS
(Covering Years 2001 – 2006)

119 W. MAIN
PRETTY PRAIRIE, KS 67570

June 20, 2002

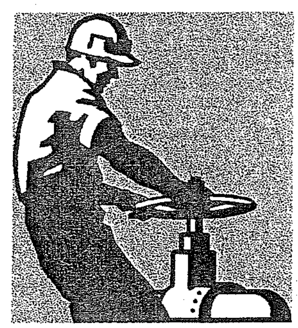


Pretty Prairie Water Quality Report—2002

A few words about your water...

Aquifer: Underground rock, clay, sand and gravel materials that store water.
Parts per million or milligrams per liter (mg/l): One part per million corresponds to one minute in two years or a single penny in $10,000.
Parts per billion (ppb) or micrograms per liter: One part per billion corresponds to one minute in 2000 years or a single penny in $10 million.
Action level: The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.
Maximum Contaminant Level (MCL): The "maximum allowed" is the highest level of a contaminant that is allowed in drinking water. MCL's are set as close to the MCLGs as feasible using the best available treatment.
Maximum Contaminant Level Goal (MCLG): The goal is the level of a contaminant in drinking water below which there is no known nor expected health risk. MCLGs allow for a margin of safety.
KDHE: Kansas Dept. of Health & Environment-the agency that moni-

Greetings from the City of Pretty Prairie and its Well Head Protection Committee—now in six years of service to the community and its water consumers. This 7 member board is comprised of patrons that are annually selected and appointed to serve by the Pretty Prairie City Council. This Committee meets as necessary on the third Tuesday of each month at 7:00 p.m. at the City Office-Library located at 119 W. Main. Please feel free to attend these meetings. The Well Head Protection Committee hopes that you will recognize the importance of having a good supply of drinking water as well as for other purposes around your home and property. Good clean water is essential for public health, safety and welfare. We take the challenge of ensuring that the capacity of your public water supply will meet today's needs with an eye to the future and the potential to serve an increasing population base. Our goal is to provide you with a safe and dependable supply of drinking water. Our water source is the Equus Beds aquifer, which is part of the High Plains regional aquifer system. The City of Pretty Prairie is drained by tributaries of the South Fork Ninnescah River. To obtain the objectives of high quality water, the City of Pretty Prairie treats its public water supply with chlorination for disinfection. This is the only treatment that our water supply requires.



More information about the system may be obtained by calling the City Office at 459-6392, and the EPA Safe Drinking Water Hotline (800-426-4791)

Facts about the system:

Contact persons for your water department:

- Tracy Phillips
  Harland Schasteen
  Dave McComb
  Water Dept.
  459-6201
- Patti Brace-
  City Clerk
- Nancy Royer-
  Deputy City Clerk
  in charge of utility billing
- City Office
  Phone—459-6392

The City of Pretty Prairie operates its public water supply from one well source, Well #5 that is located 1/4 mile northeast of town. This well went on line November 1, 1994, and pumps at a rate of 350 gpm. The depth of the well is 97 feet, 27 feet to water. It serves approximately 650 people, from 313 service connections. There are 284 residential meters, 28 commercial meters, and one bulk water meter that is located at the water tower site. Water from Well #5 is piped into the City through approximately 2000 feet of pvc pipeline, from a westerly direction across the USD #311 property and then south along the Central Ks. Railroad tracks to the water tower. The system produces $75-$80,000 in annual revenue.

The City, along with KDHE, constantly monitors the water supply for various constituents. With the dozens of samples collected by the City and KDHE, there is a chance of monitoring violations. When a monitoring violation has occurred, the City has always re-sampled and met all monitoring requirements. All drinking water, including bottled water, may be reasonably expected to contain at least small amounts of some constituents. It's important to remember that the presence of these constituents does not necessarily pose a health risk. Some people may be more vulnerable to drinking water contaminants than the general population. Immuno-compromised people, such as those with cancer undergoing chemotherapy, some who has undergone an organ transplant, those with HIV/AIDS or other immune system disorders, some elderly and infants are more at risk from infection. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency Safe Drinking Water Hotline at 1-800-426-4791.

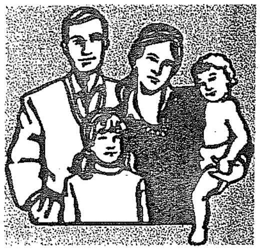
Prairie, Kansas			City Water Works				2000
			Water Quality Monitoring Results				
Contam-inant	Violation Y/N	Level De-tected	Unit Meas-urement	MCLG	MCL	Date	Likely source of contamination
Microbio-logical contami-nant—ex. coliform	Y	Coliform detected on 2/2/02		0	Coliform sample retaken		Sample was re-taken and results showed negative coliform. Coliforms are bacteria which are naturally present in the environment and are used as an indicator that other potentially harmful bacteria may be present. Coliforms were found in more samples than allowed and this was a warning of potential problems.
Inorganic Contami-nants	N	No Detect		0	None		No detects.
Nitrate	Y	mg/l	Mg/l or ppm	10 mg/l	10 mg/l	August 2000	Fertilizer run-off; leaching from septic systems; naturally occuring deposits. Infants below the age of 6 months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.

Ro ne Water Analysis for our Public Water Supply
Done August 24, 2000 by the Kansas Department of Health & Environment
Test results given are for our public water supply)

TC AL HARDNESS 115 MG/L OR PPM Calcium and magnesium are the principal minerals contributing to Total Hardness. A Total Hardness of 400 ppm is considered excessive in Kansas.
SODIUM 19.62 MG/L OR PPM People with restricted sodium diets need to be aware of sodium levels gre er than 100 ppm. There are no MCL's for sodium.
CH ORIDE 6.30 MG/L OR PPM The suggested limit for chloride is 250 ppm. Chloride has no physiological effects; some people may taste salty water after 250 ppm.
FLOURIDE 0.19 MG/L OR PPM MCL 4.0 ppm. Suggested limit is 2.0 ppm. A concentration of below .7 ppm will not be of any benefit in preventing ental cavities.
TC AL DISSOLVED SOLIDS 231.03 MG/L OR PPM EPA suggest that a TDS over 500 ppm is objectionable because of the mineral taste. It is recommended not to exceed 1000 ppm.
AL ALINITY AS CaCO3 96.11 MG/L OR PPM The alkalinity of the water is a measure of its capacity to neutralize acids.
pH 7.21 pH unit The pH value of a solution indicates the intensity of acidic or basic character of the solution. The pH scale ranges from 0-very acidic to 14 -very alkaline, with 7 being neutral.
LANGERLIER'S INDEX -0.85 MG/L OR PPM Lanerlier's Index is an indicator of corrosivity of water. KDHE interprets a water as bei ; highly aggressive if the LI is less than –2.0, moderately aggressive if between -2 and 0, and non-aggressive if greater than 0.
LEAD <1.0 ug/l Corrosion of household plumbing systems, erosion of natural deposits.
COPPER 1.4 ug/lCorrosion of household plumbing systems, erosion of natural deposits; leaching from wo preservatives.
ME CURY .0005 MG/L OR PPM Erosion of natural deposits;discharge from refineries, and factories; runoff from landfills; runoff from cropland.
SELENIUM 1.2 UG/L OR PPB Discharge from petroleum & metal refineries; erosion from natural deposits.
THALLIUM <1.0 UG/L OR PPB Leaching from ore-processing sites; discharge from electronics, glass & drug factories
CH OMIUM <1.0 UG/L OR PPB Discharge from steel and pulp mills; erosion of natural deposits.
AN IMONY <1.0 UG/L OR PPB Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder.
ARSENIC 1.7 UG/L OR PPB Erosion of natural deposits; runoff from orchards; runoff from glass production wastes
BA IUM 295.5 UG/L OR PPB Discharge of drilling wastes and from metal refineries; erosion of natural deposits.
BE YLLIUM <1.0 UG/L OR PPB Discharge from metal refineries, coal burning factories, aerospace industries.
CADMIUM <1.0 UG/L OR PPB Corrosion of galvanized pipes, old batteries & paints; erosion of natural deposits.

119 W. MAIN
PRETTY PRAIRIE, KS 67570

June 26, 2003



Pretty Prairie Water Quality Report—2003

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KDHE: Kansas Dept. of Health & Environment-the agency that moni-

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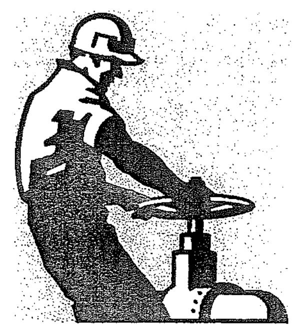

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  City Clerk
- Nancy Royer-
  Deputy City Clerk
  in charge of utility
  billing
- City Office
  Phone—459-6392

The City of Pretty Prairie operates its public water supply from one well source, Well #5 that is located 1/4 mile northeast of town. This well went on line November 1, 1994, and pumps at a rate of 350 gpm. The depth of the well is 97 feet, 27 feet to water. It serves approximately 650 people, from 313 service connections. There are 284 residential meters, 28 commercial meters, and one bulk water meter that is located at the water tower site. Water from Well #5 is piped into the City through approximately 2000 feet of pvc pipeline, from a westerly direction across the USD #311 property and then south along the Central Ks. Railroad tracks to the water tower. The system produces $75-$80,000 in annual revenue.

The City, along with KDHE, constantly monitors the water supply for various constituents. With the dozens of samples collected by the City and KDHE, there is a chance of monitoring violations. When a monitoring violation has occurred, the City has always resampled and met all monitoring requirements. All drinking water, including bottled water, may be reasonably expected to contain at least small amounts of some constituents. It's important to remember that the presence of these constituents does not necessarily pose a health risk. Some people may be more vulnerable to drinking water contaminants than the general population. Immuno-compromised people, such as those with cancer undergoing chemotherapy, some who has undergone an organ transplant, those with HIV/AIDS or other immune system disorders, some elderly and infants are more at risk from infection. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency Safe Drinking Water Hotline at 1-800-426-4791.

...sion to the report:

Pretty Prairie, Kansas			City Water Works				2003
			Water Quality Monitoring Results				
Contaminant	**Violation Y/N**	**Level Detected**	**Unit Measurement**	**MCLG**	**MCL**	**Date**	**Likely source of contamination**
Microbiological contaminant—ex. coliform	N	No Coliform detected		0	0		No detects.
Inorganic Contaminants	N	No Detect		0	None		No detects.
Nitrate	Y	11.7 mg/l	Mg/l or ppm	10 mg/l	10 mg/l	June 13 2002	Fertilizer run-off; leaching from septic systems; naturally occuring deposits. Infants below the age of 6 months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.

Routine Water Analysis for our Public Water Supply
Done August 24, 2000 by the Kansas Department of Health & Environment
(Test results given are for our public water supply)

TOTAL HARDNESS 115 MG/L OR PPM Calcium and magnesium are the principal minerals contributing to Total Hardness. A Total Hardness of 400 ppm is considered excessive in Kansas.
SODIUM 19.62 MG/L OR PPM People with restricted sodium diets need to be aware of sodium levels greater than 100 ppm. There are no MCL's for sodium.
CHLORIDE 6.30 MG/L OR PPM The suggested limit for chloride is 250 ppm. Chloride has no physiological effects; some people may taste salty water after 250 ppm.
FLOURIDE 0.19 MG/L OR PPM MCL 4.0 ppm. Suggested limit is 2.0 ppm. A concentration of below .7 ppm will not be of any benefit in preventing dental cavities.
TOTAL DISSOLVED SOLIDS 231.03 MG/L OR PPM EPA suggest that a TDS over 500 ppm is objectionable because of the mineral taste. It is recommended not to exceed 1000 ppm.
ALKALINITY AS CaCO3 96.11 MG/L OR PPM The alkalinity of the water is a measure of its capacity to neutralize acids.
pH 7.21 pH unit The pH value of a solution indicates the intensity of acidic or basic character of the solution. The pH scale ranges from 0-very acidic to 14 -very alkaline, with 7 being neutral.
LANGERLIER'S INDEX -0.85 MG/L OR PPM Langerlier's Index is an indicator of corrosivity of water. KDHE interprets a water as being highly aggressive if the LI is less than –2.0, moderately aggressive if between -2.0 and 0, and non-aggressive if greater than 0.
LEAD <1.0 ug/l Corrosion of household plumbing systems, erosion of natural deposits.
COPPER 1.4 ug/lCorrosion of household plumbing systems, erosion of natural deposits; leaching from wood preservatives.
MERCURY .0005 MG/L OR PPM Erosion of natural deposits;discharge from refineries, and factories; runoff from landfills; runoff from cropland.
SELENIUM 1.2 UG/L OR PPB Discharge from petroleum & metal refineries; erosion from natural deposits.
THALLIUM <1.0 UG/L OR PPB Leaching from ore-processing sites; discharge from electronics, glass & drug factories
CHROMIUM <1.0 UG/L OR PPB Discharge from steel and pulp mills; erosion of natural deposits.
ANTIMONY <1.0 UG/L OR PPB Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder.
ARSENIC 1.7 UG/L OR PPB Erosion of natural deposits; runoff from orchards; runoff from glass production wastes
BARIUM 295.5 UG/L OR PPB Discharge of drilling wastes and from metal refineries; erosion of natural deposits.
BERYLLIUM <1.0 UG/L OR PPB Discharge from metal refineries, coal burning factories, aerospace industries.
CADMIUM <1.0 UG/L OR PPB Corrosion of galvanized pipes, old batteries & paints; erosion of natural deposits.

CITY OF PRETTY PRAIRIE

(Name of water system)

Annual Water Quality Report - 2004

Covers Calendar Year 2003

This brochure is a snapshot of the quality of the water that we provided last year. Included are details about where your water comes from, what it contains, and how it compares to Environmental Protection Agency (EPA) and state standards. We are committed to providing you with information because informed customers are our best allies. It's important that customers be aware of the efforts that are made continually to improve their water system. To learn more, please attend any of the regularly scheduled meetings which are held as necessary on the 3rd Tuesday of each month at 7:00 P.M. at the City Office. For more information please contact Patti Brace (620) 459-6392.

Your water comes from 1 groundwater well. We treat your water to remove several contaminates and also add disinfectant to protect you against microbial contaminants. An assessment of our source water has been completed. For the results of the assessment, please contact us or download the results at www.kdhe.state.ks.us/nps.

A Message From EPA

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (800-426-4791).

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water before we treat it include:

***Microbial contaminants,** such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.
***Inorganic contaminants,** such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.
***Pesticides and herbicides,** which may come from a variety of sources such as agriculture and residential uses.
***Radioactive contaminants,** which are naturally occurring.
***Organic chemical contaminants,** including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.

In order to ensure that tap water is safe to drink, EPA prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. We treat our water according to EPA's regulations. Food and Drug Administration regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

Total Coliform Rule (TCR) - Coliform bacteria are usually harmless, but their presence in water can be an indication of disease-causing bacteria. When coliform bacteria are found, special follow-up tests are done to determine if harmful bacteria are present in the water supply. If this limit is exceeded, the water supplier must notify the public by newspaper, television or radio. During 2003, we collected two samples per month, and all were in compliance .

WATER QUALITY DATA

noted, the data presented in this table is from testing done January 1 - December 31, 2003. The presence ese contaminants in the water does not necessarily indicate that the water poses a health risk. The state equires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, is more than one year old.

The bottom line is that the water that is provided to you is safe.

TERMS & ABBREVIATIONS:

Maximum Contaminant Level Goal(MCLG): the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

Maximum Contaminant Level (MCL): the highest level of contaminant that is allowed in drinking wter. MCLs are set close to the MCLGs allow for a margin of safety.

Action Level(AL): the concentration of a contaminant which, when exceeded, triggers treatment or other requirements which a water system must follow.

N/A: not applicable **ND:** non detect at testing **ppb:** parts per billion or micrograms per liter **ppm** parts per million or milligrams per liter . **pCi/l:** picocuries per liter(a measure of radiation).

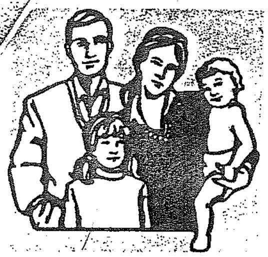
TESTING RESULTS FOR: CITY OF PRETTY PRAIRIE

REGULATED CONTAMINANTS	COLL DATE	RESULT	UNIT	MCL	MCLG	Vio	TYPICAL SOURCE
rsenic	04/03	2	ppb	50	50	N	Erosion of natural deposits
Barium		0.338	ppm	2	2	N	Erosion of natural deposits
Selenium		1	ppb	50	50	N	Erosion of natural deposits
luoride		0.19	ppm	4	4	N	Additive which promotes strong teeth
litrate		*12.13	ppm	10	10	Y	Erosion of natural deposits

*Nitrate in drinking water at levels above 10 ppm is a health risk for infants of less than six months of age. High nitrate levels in rinking water can cause blue baby syndrome. Nitrate levels may rise quickly for short periods of time because of rainfall or gricultural activity. If you are caring for an infant, you should ask for advice from your health care provider.

90th PERCENTILE	DATE				Sites over AL	Vio	TYPICAL SOURCE
Lead	08/02	4.4	ppb	AL=15	0	N	Corrosion of household plumbing system.
opper	08/02	0.0432	ppm	AL=1.3	0	N	Corrosion of household plumbing system.

SECONDARY CONTAM.	DATE	RESULT	UNIT			Vio	TYPICAL SOURCE
alcium	04/03	39	ppm	75-200		N	Erosion of natural deposits
lagnesium		6.11	ppm	50-150		N	Erosion of natural deposits
Sodium		20	ppm	100		N	Erosion of natural deposits
otassium		1.23	ppm	100		N	Erosion of natural deposits
hloride		6.35	ppm	250		N	Erosion of natural deposits
Sulfate		20	ppm	250		N	Erosion of natural deposits
otal Hardness		123	ppm	400		N	Erosion of natural deposits
lkalinity as CACO3		98	ppm	60-300		N	Erosion of natural deposits
pH		6.97	pH units	6.5-8.5		N	Erosion of natural deposits
Specific Conductivity		350	umho/l	1500		N	Erosion of natural deposits
ot. Dissolved Solids		236	ppm	500		N	Erosion of natural deposits
otal Phosphorus(P)		0.084	ppm	5.0		N	Erosion of natural deposits
Silica		29	ppm	50		N	Erosion of natural deposits
orrosivity		1.04	LI	0-+1.0		N	Erosion of natural deposits



119 W. MAIN
PRETTY PRAIRIE, KS 67570

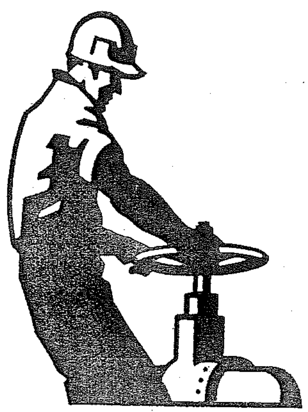
June 27, 2005

Pretty Prairie Water Quality Report—2005

A few words about your water...

Aquifer: Underground rock, clay, sand and gravel materials that store water.
Parts per million or milligrams per liter (mg/l): One part per million corresponds to one minute in two years or a single penny in $10,000.
Parts per billion (ppb) or micrograms per liter: One part per billion corresponds to one minute in 2000 years or a single penny in $10 million.
Action level: The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.
Maximum Contaminant Level (MCL): The "maximum allowed" is the highest level of a contaminant that is allowed in drinking water. MCL's are set as close to the MCLGs as feasible using the best available treatment.
Maximum Contaminant Level Goal (MCLG): The goal is the level of a contaminant in drinking water below which there is no known nor expected health risk. MCLGs allow for a margin of safety.
KDHE: Kansas Dept. of Health & Environment-the agency that

Greetings from the City of Pretty Prairie and its Well Head Protection Committee— This 7 member board is comprised of patrons that are annually selected and appointed to serve by the Pretty Prairie City Council. This Committee meets as necessary on the third Tuesday of each month at 7:00 p.m. at the City Office-Library located at 119 W. Main. The City of Pretty Prairie hopes that you will recognize the importance of having a good supply of drinking water as well as for other purposes around your home and property. Good clean water is essential for public health, safety and welfare. We take the challenge of ensuring that the capacity of your public water supply will meet today's needs with an eye to the future and the potential to serve an increasing population base. Our goal is to provide you with a safe and dependable supply of drinking water. Our water source is the Equus Beds aquifer, which is part of the High Plains regional aquifer system. The City of Pretty Prairie is drained by tributaries of the South Fork Ninnescah River. To obtain the objectives of high quality water, the City of Pretty Prairie treats its public water supply with chlorination for disinfection. This is the only treatment that our water supply requires.



More information about the system may be obtained by calling the City Office at 459-6392, and the EPA Safe Drinking Water Hotline (800-426-4791)

Contact persons for your water department:

- **Harland Schasteen Dave McComb Water Dept. 459-6201**
- **Patti Brace- City Clerk**
- **Nancy Royer- Deputy City Clerk in charge of utility billing**
- **City Office Phone—459-6392**

Facts about the system:

The City of Pretty Prairie operates its public water supply from one well source. Well #5 that is located 1/4 mile northeast of town. This well went on line November 1, 1994, and pumps at a rate of 350 gpm. The depth of the well is 97 feet, 27 feet to water. It serves approximately 650 people, from 313 service connections. There are 284 residential meters, 28 commercial meters, and one bulk water meter that is located at the water tower site. Water from Well #5 is piped into the City through approximately 2000 feet of pvc pipeline, from a westerly direction across the USD #311 property and then south along the Central Ks. Railroad tracks to the water tower. The system produces $75-$80,000 in annual revenue.

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More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency Safe Drinking Water Hotline at 1-800-426-4791.

Terms & Abbreviations

aminant Level Goal (MCLG): the level of a contaminant in drinking water below which there is no known k to health. MCLGs allow for a margin of safety.

ontaminant Level (MCL): the highest level of contaminant that is allowed in drinking water. MCLs are set as e MCLGs allow for a margin of safety.

evel (AL): the concentration of a contaminant which, when exceeded, triggers treatment or other requirements water system must follow.

ment Technique (TT): a required process intended to reduce the level of contaminants in water

: parts per billion or micrograms per liter (µg/L) **ppm**: parts per million or milligrams per liter (mg/L)

A: not applicable **ND**: non detect at testing limit **pCi/L**: picocuries per liter (a measure of radiation)

TESTING RESULTS FOR: CITY OF PRETTY PRAIRIE

REGULATED CONTAMINANTS	DATE	RESULT	UNIT	MCL	MCLG	Violation (Yes/No)	TYPICAL SOURCE
Arsenic	04/03	2	ppb	50	50	N	Erosion of natural deposits
Barium		0.338	ppm	2	2	N	Erosion of natural deposits
Selenium		1	ppb	50	50	N	Erosion of natural deposits
Fluoride		0.190	ppm	4	4	N	Erosion of natural deposits
Nitrate	2004	12	ppm	10	10	Y	Erosion of natural deposits
Total Trihalomethanes	2003	3	ppb	80	N/A	N	By-product of drinking water disinfection
Haloacetic Acids	2003	4	ppb	60	N/A	N	By-product of drinking water disinfection

90th PERCENTILE	DATE	RESULT	UNIT	AL	Sites over AL	Violation	TYPICAL SOURCE
Lead	08/02	3	ppb	AL=15	0	N	Corrosion of household plumbing system
Copper	08/02	4	ppm	AL=1.3	0	N	Corrosion of household plumbing system

SECONDARY CONTAMINANTS	DATE	RESULT	UNIT	SMCL			TYPICAL SOURCE
Calcium	04/03	39	ppm	75-200		N	Erosion of natural deposits
Magnesium		6	ppm	50-150		N	Erosion of natural deposits
Sodium		20	ppm	100		N	Erosion of natural deposits
Potassium		1	ppm	100		N	Erosion of natural deposits
Chloride		6	ppm	250		N	Erosion of natural deposits
Sulfate		21	ppm	250		N	Erosion of natural deposits
Total Hardness		124	ppm	400		N	Erosion of natural deposits
Alkalinity as CACO3		99	ppm	60-300		N	Erosion of natural deposits
pH		6.97	pH units	6.5-8.5		N	Erosion of natural deposits
Specific Conductivity		350	umho/cu	1500		N	Erosion of natural deposits
Total Dissolved Solids		217	ppm	500		N	Erosion of natural deposits
Total Phosphorus (P)		0.084	ppm	5		N	Erosion of natural deposits
Silica		29	ppm	50		N	Erosion of natural deposits

INCLUDE ANY ADDITIONAL REQUIRED HEALTH EFFECTS LANGUAGE OR VIOLATION NOTICE IN THIS SECTION

Nitrate in drinking water at levels above 10 ppm is a health risk for infants of less than 6 months of age. High nitrate levels in drinking water can cause blue baby syndrome. Nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity. If you are caring for an infant, you should ask for advice from your health care provider.

PRETTY PRAIRIE
Consumer Confidence Report – 2006
Covering Calendar Year – 2005

This brochure is a snapshot of the quality of the water that we provided last year. Included are the details about where your water comes from, what it contains, and how it compares to Environmental Protection Agency (EPA) and state standards. We are commited to providing you with information because informed customers are out best allies. It is important that customers be aware of the efforts that are made continually improve their water systems. <u>To learn more about your drinking water, please attend any of the regularly scheduled meetings which are held: 1st Monday at 7:00 P.M. at City Hall, 119 W. Main.</u> For more information please contact, CURT MILLER at 620-459-6392.

Your water comes from 1 Ground Water Well.

Your water is treated to remove several contaminants and a disinfectant is added to protect you against microbial contaminants. The Safe Drinking Water Act (SDWA) required states to develop a Source Water Assessment (SWA) for each public water supply that treats and distributes raw source water in order to identify potential contamination sources. The state has completed an assessment of our source water. For results of the assessment, please contact us or view on-line at: http://www.kdheks.gov/nps/swap/SWreports.html

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as those with cancer under going chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (800-426-4791).

The sources of drinking water (both tap water and bottled water) included rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in sources water before we treat it include:
Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, livestock operations and wildlife.
Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.
Pesticides and herbicides, which may come from a variety of sources such as storm water run-off, agriculture, and residential users.
Radioactive contaminants, which can be naturally occurring or the result of mining activity.
Organic contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and also come from gas stations, urban storm water run-off, and septic systems.

In order to ensure that tap water is safe to drink, EPA prescribes regulation which limits the amount of certain contaminants in water provided by public water systems. We treat our water according to EPA's regulations. Food and Drug Administration regulations establish limits for contaminants in bottled water, with must provide the same protection for public health.

Our water system tested a minimum of 2 samples per month in accordance with the Total Coliform Rule for microbiological contaminants. Coliform bacteria are usually harmless, but their presences in water can be an indication of disease-causing bacteria. When coliform bacteria are found, special follow-up tests are done to determine if harmful bacteria are present in the water supply. If this limit is exceeded, the water supplier must notify the public.

Water Quality Data

The tables following below list all of the drinking water contaminants, which were detected during the 2005 calendar year. The presence of these contaminants does not necessarily indicate the water poses a health risk. Unless noted, the data presented in this table is from the testing done January 1- December 31, 2005. The state requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, is more than one year old. **The bottom line is that the water that is provided to you is safe.**

Terms & Abbreviations

Maximum Contaminant Level Goal (MCLG): the "Goal" is the level of a contaminant in drinking water below which there is no known or expected risk to human health. MCLGs allow for a margin of safety.
Maximum Contaminant Level (MCL): the "Maximum Allowed" MCL is the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
Secondary Maximum Contaminant Level (SMCL): recommended level for a contaminant that is not regulated and has no MCL.
Action Level (AL): the concentration of a contaminant that, if exceeded, triggers treatment or other requirements.
Treatment Technique (TT): a required process intended to reduce levels of a contaminant in drinking water.
Maximum Residual Disinfectant Level (MRDL): the highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
Maximum Residual Disinfectant Level Goal (MRDLG): the level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
Non-Detects (ND): lab analysis indicates that the contaminant is not present.
Parts per Million (ppm) or milligrams per liter (mg/l)
Parts per Billion (ppb) or micrograms per liter (µg/l)
Picocuries per Liter (pCi/L): a measure of the radioactivity in water.
Millirems per Year (mrem/yr): measure of radiation absorbed by the body.
Million Fibers per Liter (MFL): a measure of the presence of asbestos fibers that are longer than 10 micrometers.
Nephelometric Turbidity Unit (NTU): a measure of the clarity of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

Testing Results for CITY OF PRETTY PRAIRIE

Microbiological	Result	MCL	MCLG	Typical Source
No Detected Results were Found in the Calendar Year of 2005				

Regulated Contaminants	Collection Date	Highest Value	Range	Unit	MCL	MCLG	Typical Source
ARSENIC	4/7/2003	2.14	2.14	ppb	50		Erosion of natural deposits
ATRAZINE	6/2/2003	0.1	0.1	ppb	3	3	Runoff from herbicide used on row crops
BARIUM	4/7/2003	0.3389	0.3389	ppm	2	2	Discharge from metal refineries
FLUORIDE	4/7/2003	0.19	0.19	ppm	4	4	Natural deposits. Water additive which promotes strong teeth.
NITRATE (AS N)	5/31/2005	12	6.94 - 12	ppm	10	10	Runoff from fertilizer use
SELENIUM	4/7/2003	1.34	1.34	ppb	50	50	Erosion of natural deposits

Lead and Copper	Monitoring Period	90TH Percentile	Range	Unit	AL	Sites Over AL	Typical Source
COPPER	2002	0.0432	0.0157 - 0.2686	ppm	1.3	0	Corrosion of household plumbing systems
LEAD	2002	4.4	1 - 24.7	ppb	15	0	Corrosion of household plumbing systems

Radionuclides	Collection Date	Highest Value	Range	Unit	MCL	MCLG	Typical Source
RADIUM, COMBINED (226, 228)	10/6/2003	2.7	2.7	pCi/l	5	0	Erosion of natural deposits
RADIUM-228	10/6/2003	2.7	2.7	pCi/l	5	0	

Secondary Contaminants	Collection Date	Highest Value	Range	Unit	SMCL
ALKALINITY, TOTAL	4/7/2003	98.58	98.58	MG/L	300
CALCIUM	4/7/2003	39.481	39.481	MG/L	200
CHLORIDE	4/7/2003	6.35	6.35	MG/L	250
CONDUCTIVITY	4/7/2003	350.3	350.3	UMHOS/CM	1500
CORROSIVITY	4/7/2003	1.042	1.042	LANG	0
HARDNESS, TOTAL (AS CACO3)	4/7/2003	123.709	123.709	MG/L	400
MAGNESIUM	4/7/2003	6.113	6.113	MG/L	150
PH	4/7/2003	6.97	6.97	PH	8.5
PHOSPHORUS	4/7/2003	0.084	0.084	MG/L	5
POTASSIUM	4/7/2003	1.231	1.231	MG/L	100
SILICA	4/7/2003	29.124	29.124	MG/L	50
SODIUM	4/7/2003	20.179	20.179	MG/L	100
SOLIDS, TOTAL DISSOLVED (TDS)	4/7/2003	236.555	236.555	MG/L	500
SULFATE	4/7/2003	20.95	20.95	MG/L	250

During the 2005 calendar year, we had the below noted violation(s) of drinking water regulations.
Nitrate – 1st & 2nd quarter 2005 exceeded maximum contaminant level (MCL).

Additional Required Health Effects Language

Nitrate in drinking water at levels above 10 ppm is a health risk for infants of less than six months of age. High nitrate levels in drinking water can cause blue baby syndrome. Nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity. If you are caring for an infant you should ask for advice from your health care provider.

..ITY OF PRETTY PRAIRIE
Consumer Confidence Report – 2007
Covering Calendar Year – 2006

This brochure is a snapshot of the quality of the water that we provided last year. Included are the details about where your water comes from, what it contains, and how it compares to Environmental Protection Agency (EPA) and state standards. We are committed to providing you with information because informed customers are out best allies. It is important that customers be aware of the efforts that are made continually improve their water systems. <u>To learn more about your drinking water, please attend any of the regularly scheduled meetings which are held: (Date/Time/Location of meeting).</u> 1st Monday of each month 7:00pm For more information please contact, Patti Brace, City Clerk 620-459-6392.

Your water comes from 2 Ground Water Wells.

Your water is treated to remove several contaminants and a disinfectant is added to protect you against microbial contaminants. The Safe Drinking Water Act (SDWA) required states to develop a Source Water Assessment (SWA) for each public water supply that treats and distributes raw source water in order to identify potential contamination sources. The state has completed an assessment of our source water. For results of the assessment, please contact us or view on-line at: http://www.kdheks.gov/nps/swap/SWreports.html

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as those with cancer under going chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (800-426-4791).

The sources of drinking water (both tap water and bottled water) included rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in sources water before we treat it include:
Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, livestock operations and wildlife.
Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.
Pesticides and herbicides, which may come from a variety of sources such as storm water run-off, agriculture, and residential users.
Radioactive contaminants, which can be naturally occurring or the result of mining activity.
Organic contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and also come from gas stations, urban storm water run-off, and septic systems.

In order to ensure that tap water is safe to drink, EPA prescribes regulation which limits the amount of certain contaminants in water provided by public water systems. We treat our water according to EPA's regulations. Food and Drug Administration regulations establish limits for contaminants in bottled water, with must provide the same protection for public health.

Our water system tested a minimum of 2 samples per month in accordance with the Total Coliform Rule for microbiological contaminants. Coliform bacteria are usually harmless, but their presences in water can be an indication of disease-causing bacteria. When coliform bacteria are found, special follow-up tests are done to determine if harmful bacteria are present in the water supply. If this limit is exceeded, the water supplier must notify the public.

Water Quality Data

The tables following below list all of the drinking water contaminants, which were detected during the 2006 calendar year. The presence of these contaminants does not necessarily indicate the water poses a health risk. Unless noted, the data presented in this table is from the testing done January 1- December 31, 2006. The state requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, is more than one year old. **The bottom line is that the water that is provided to you is safe.**

Terms & Abbreviations

Maximum Contaminant Level Goal (MCLG): the "Goal" is the level of a contaminant in drinking water below which there is no known or expected risk to human health. MCLGs allow for a margin of safety.
Maximum Contaminant Level (MCL): the "Maximum Allowed" MCL is the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
Secondary Maximum Contaminant Level (SMCL): recommended level for a contaminant that is not regulated and has no MCL.
Action Level (AL): the concentration of a contaminant that, if exceeded, triggers treatment or other requirements.
Treatment Technique (TT): a required process intended to reduce levels of a contaminant in drinking water.
Maximum Residual Disinfectant Level (MRDL): the highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
Non-Detects (ND): lab analysis indicates that the contaminant is not present.
Parts per Million (ppm) or milligrams per liter (mg/l)
Parts per Billion (ppb) or micrograms per liter (μg/l)
Picocuries per Liter (pCi/L): a measure of the radioactivity in water.
Millirems per Year (mrem/yr): measure of radiation absorbed by the body.
Million Fibers per Liter (MFL): a measure of the presence of asbestos fibers that are longer than 10 micrometers.
Nephelometric Turbidity Unit (NTU): a measure of the clarity of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

Testing Results for CITY OF PRETTY PRAIRIE

Microbiological	Result	MCL	MCLG	Typical Source
COLIFORM, TOTAL (TCR)	In the month of March, 1 sample(s) returned as positive	MCL: Systems that Collect Less Than 40 Samples per Month - No more than 1 positive monthly sample	0	Naturally present in the environment

Regulated Contaminants	Collection Date	Highest Value	Range	Unit	MCL	MCLG	Typical Source
ARSENIC	3/20/2006	1.7	1.7	ppb	10.000		Erosion of natural deposits
BARIUM	3/20/2006	0.3	0.3	ppm	2	2	Discharge from metal refineries;
CHROMIUM	3/20/2006	1.8	1.8	ppb	100	100	Discharge from steel and pulp mills
FLUORIDE	3/20/2006	0.22	0.22	ppm	4	4	Natural deposits; Water additive which promotes strong teeth.
NITRATE (AS N)	5/1/2006	12.6	12 - 12.6	ppm	10	10	Runoff from fertilizer use
SELENIUM	3/20/2006	1.1	1.1	ppb	50	50	Erosion of natural deposits

Disinfection Byproducts	Monitoring Period	Highest RAA	Range	Unit	MCL	MCLG	Typical Source
TOTAL TRIHALOMETHANES (TTHM)	2005 - 2007	2	2.2	ppb	80	0	By-product of drinking water chlorination

Lead and Copper	Monitoring Period	90TH Percentile	Range	Unit	AL	Sites Over AL	Typical Source
COPPER	2005 - 2007	0.18	0.03 - 0.37	ppm	1.3	0	Corrosion of household plumbing systems
LEAD	2005 - 2007	3.9	1.9 - 5.5	ppb	15	0	Corrosion of household plumbing systems

Radionuclides	Collection Date	Highest Value	Range	Unit	MCL	MCLG	Typical Source
RADIUM, COMBINED (226, 228)	10/6/2003	2.7	2.7	pCi/l	5	0	Erosion of natural deposits
RADIUM-228	10/6/2003	2.7	2.7	pCi/l	5	0	

Secondary Contaminants	Collection Date	Highest Value	Range	Unit	SMCL
ALKALINITY, TOTAL	3/20/2006	103	103	MG/L	300
CALCIUM	3/20/2006	40	40	MG/L	200
CHLORIDE	3/20/2006	5.9	5.9	MG/L	250
CONDUCTIVITY	3/20/2006	350	350	UMHOS/CM	1500
HARDNESS, TOTAL (AS CACO3)	3/20/2006	130	130	MG/L	400
MAGNESIUM	3/20/2006	6.4	6.4	MG/L	150
NICKEL	3/20/2006	0.0062	0.0062	MG/L	0.1
PH	3/20/2006	7	7	PH	8.5
PHOSPHORUS	3/20/2006	0.049	0.049	MG/L	5
POTASSIUM	3/20/2006	1.2	1.2	MG/L	100
SILICA	3/20/2006	29	29	MG/L	50
SODIUM	3/20/2006	20	20	MG/L	100
SOLIDS, TOTAL DISSOLVED (TDS)	3/20/2006	240	240	MG/L	500
SULFATE	3/20/2006	23	23	MG/L	250
ZINC	3/20/2006	0.047	0.047	MG/L	5

During the 2006 calendar year, we had no violation(s) of drinking water regulations.

Nitrate – Maximum Contaminant Level (MCL) violation 1st and 2nd quarter 2006.

Public Notice Rule (PN) – failure to notify public 1st quarter 2006.

Additional Required Health Effects Language:

Nitrate in drinking water at levels above 10 ppm is a health risk for infants of less than six months of age. High nitrate levels in drinking water can cause blue baby syndrome. Nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity. If you are caring for an infant, you should ask for advice rom your health care provider.

Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially-harmful, bacteria may be present. Coliforms were found in more samples than allowed and this was a warning of potential problems.

APPENDIX B

MUNICIPAL WATER USE REPORTS
(2002 - 2006)

2C

PART B: MONTHLY WATER USE SUMMARY

NOTE: REPORT WATER PUMPED, PURCHASED, AND SOLD FOR THE MONTH OF ACTUAL USE. REPORT ALL AMOUNTS IN UNITS OF 1000 GALLONS.

14078 1 / MUN

Column 1: The amount of water diverted, by month, from all points of diversion (wells or intakes). If possible, raw water meters should be read at the same time of the month as customer meters. The total amount in this column should equal the total of the amounts reported in PART A.

Column 2: The amount of water purchased, by month, from all other public water supply systems or the Kansas Water Office. Please provide further detail in PART E.

Column 3: The amount of water sold, by month, to all other public water supply systems. Please provide further detail in PART E.

Column 4: The amount of water sold, by month, to all industrial, pasture, stockwater, feedlot, and bulk water service connections. For rural water districts, include the amount of water sold to farmsteads using at least 200,000 gallons of water per year. Also include metered power plant usage, even if this water is supplied free.

Column 5: The amount of water sold, by month, to your residential, commercial and institutional customers (include hospitals, schools and prisons).

Column 6: The amount of water used, by month, that is metered at individual service connections and supplied free, such as for public service, treatment processes, and connections receiving free water. Please record metered power plant usage with industrial water use in Column 4.

Column 7: The amount of unaccounted for water, by month. The gallons reported in this column are found by adding the numbers in Columns 1 and 2 and subtracting the numbers in Columns 3, 4, 5, and 6. If you do not sell water to your customers, this column simply represents the total amount of water that you diverted or purchased.

Month	Column 1 Raw Water Diverted Under Your Rights (1000 Gallons)	Column 2 Water Purchased From All Sources (1000 Gallons)	Column 3 Water Sold to Other Public Water Suppliers (1000 Gallons)	Column 4 Water Sold to Your Industrial, Stock, and Bulk Customers (1000 Gallons)	Column 5 Water Sold to Your Residential and Commercial Customers (1000 Gallons)	Column 6 Metered Water Provided Free (1000 Gallons)	Column 7 Unaccounted For Water (See Above Explanation) (1000 Gallons)
Jan.	2,053			13	2,839	26	-825
Feb.	1,462			16	1,566	10	-130
Mar.	1,955			19	1,233	10	693
Apr.	2,337			2	1,965	66	304
May	13,498			0	2,113	62	11,323
June	3,427			20	2,054	38	1,315
July	6,215			25	3,912	144	2,134
Aug.	4,067			0	5,312	236	-1,481
Sept.	3,918			0	3,095	72	751
Oct.	2,171			22	2,588	81	-520
Nov.	1,687			0	0	0	1,687
Dec.	1,877			0	3,095	32	-1,250
Total	44,667			117	29,772	777	14,001

PART C: POPULATION, SERVICE CONNECTIONS, AND WATER RATES

1. Population served: 670 Estimate the number of persons served directly by your distribution system (Columns 5, 6, and 7).

2. Number of ACTIVE water service connections as of December 31:

a. 284 Residential
b. 28 Commercial/Institutional
c. 1 Bulk Meter Industrial
d. ______ Pasture/Stockwater/Feedlot
e. ______ Other (specify) ______
f. 313 **Total ACTIVE Service Connections**

3. If you are a city, how many of the active residential water service connections shown in 2a. are located outside of your city limits. ______

Date of last water rate change (Month and Year): 10-01-2001 If rates changed during 2002, please attach a copy of new rate structures that apply to residential users.

PART B: MONTHLY WATER USE SUMMARY

NOTE: REPORT WATER PUMPED, PURCHASED, AND SOLD FOR THE MONTH OF ACTUAL USE. REPORT ALL AMOUNTS IN UNITS OF 1000 GALLONS

11520 14078 1 / MUN

Column 1: The amount of water diverted, by month, from all points of diversion (wells or intakes). If possible, raw water meters should be read at the same time of the month as customer meters. The total amount in this column should equal the total of the amounts reported in PART A.

Column 2: The amount of water purchased, by month, from all other public water supply systems or the Kansas Water Office. Please provide further detail in PART E.

Column 3: The amount of water sold, by month, to all other public water supply systems. Please provide further detail in PART E.

Column 4: The amount of water sold, by month, to all industrial, pasture, stockwater, feedlot, and bulk water service connections. For rural water districts, include the amount of water sold to farmsteads using at least 200,000 gallons of water per year. Also include metered power plant usage, even if this water is supplied free.

Column 5: The amount of water sold, by month, to your residential, commercial and institutional customers (include hospitals, schools and prisons).

Column 6: The amount of water used, by month, that is metered at individual service connections and supplied free, such as for public service, treatment processes, and connections receiving free water. Please record metered power plant usage with industrial water use in Column 4.

Column 7: The amount of unaccounted for water, by month. The gallons reported in this column are found by adding the numbers in Columns 1 and 2 and subtracting the numbers in Columns 3, 4, 5, and 6. If you do not sell water to your customers, this column simply represents the total amount of water that you diverted or purchased.

Month	Column 1 Raw Water Diverted Under Your Rights (1000 Gallons)	Column 2 Water Purchased From All Sources (1000 Gallons)	Column 3 Water Sold to Other Public Water Suppliers (1000 Gallons)	Column 4* Water Sold to Your Industrial, Stock, and Bulk Customers (1000 Gallons)	Column 5 Water Sold to Your Residential and Commercial Customers (1000 Gallons)	Column 6 Metered Water Provided Free (1000 Gallons)	Column 7 Unaccounted For Wa (See Above Explanati (1000 Gallons)
Jan. 15	5,417			0	3,095	32	2,290
Feb. 15	1,740			53	1,312	8	367
Mar. 15	1,597			13	1,526	1	57
Apr. 15	2,100			44	1,272	22	762
May 15	2,572			37	1,798	46	691
June 15	2,599			2	1,730	12	855
July 15	6,217			0	2,671	69	3,477
Aug. 15	6,828			21	5,635	597	575
Sept 15	4,622			13	6,811	41	-2,243
Oct. 20	3,390			4	1,676	546	1,164
Nov. 21	2,208			0	1,895	37	276
Dec.	3,092			18	2,547	31	496
Total	42,382			205	31,968	1,442	8,767

*Meters not read in Dec due to 8" of snow on meter lids, were read Jan 15, 2004 for this report

PART C: POPULATION, SERVICE CONNECTIONS, AND WATER RATES

1. Population served: 670 Estimate the number of persons served directly by your distribution system (Columns 5, 6, and 7).

2. Number of ACTIVE water service connections as of December 31

a. 285 Residential

b. 29 Commercial/Institutional

c. 1 Bulk meter Industrial

d. ______ Pasture/Stockwater/Feedlot

e. ______ Other (specify) ______

f. 315 Total ACTIVE Service Connections

3. If you are a city, how many of the active residential water service connections shown in 2a are located outside of your city limits 5

4. Date of last water rate change (Month and Year), 10/01/2001 If rates changed during 2002, please attach a copy of new rate structures that apply to residential users.

PART B: MONTHLY WATER USE SUMMARY

2004 MUNICIPAL WATER USE REPORT (PUBLIC WATER SUPPLY)

CITY OF PRETTY PRAIRIE

11380 14078 1 / MUN

NOTE: REPORT WATER PUMPED, PURCHASED, AND SOLD FOR THE MONTH OF ACTUAL USE. REPORT ALL AMOUNTS IN UNITS OF 1000 GALLONS.

Column 1: The amount of water diverted, by month, from all points of diversion (wells or intakes). If possible, raw water meters should be read at the same time of the month as customer meters. The total amount in this column should equal the total of the amounts reported in PART A.

Column 2: The amount of water purchased, by month, from all other public water supply systems or the Kansas Water Office. Please provide further detail in PART E.

Column 3: The amount of water sold, by month, to all other public water supply systems. Please provide further detail in PART E.

Column 4: The amount of water sold, by month, to all industrial, pasture, stockwater, feedlot, and bulk water service connections. For rural water districts, include the amount of water sold to farmsteads using at least 200,000 gallons of water per year. Also include metered power plant usage, even if this water is supplied free.

Column 5: The amount of water sold, by month, to your residential, commercial and institutional customers (include hospitals, schools and prisons).

Column 6: The amount of water used, by month, that is metered at individual service connections and supplied free, such as for public service, treatment processes, and connections receiving free water. Please record metered power plant usage with industrial water use in Column 4.

Column 7: The amount of unaccounted for water, by month. The gallons reported in this column are found by adding the numbers in Columns 1 and 2 and subtracting the numbers in Columns 3, 4, 5, and 6. If you do not sell water to your customers, this column simply represents the total amount of water that you diverted or purchased.

Month	Column 1 Raw Water Diverted Under Your Rights (1000 Gallons)	Column 2 Water Purchased From All Sources (1000 Gallons)	Column 3 Water Sold to Other Public Water Suppliers (1000 Gallons)	Column 4 Water Sold to Your Industrial, Stock, and Bulk Customers (1000 Gallons)	Column 5 Water Sold to Your Residential and Commercial Customers (1000 Gallons)	Column 6 Metered Water Provided Free (1000 Gallons)	Column 7 Unaccounted For Water (See Above Explanation) (1000 Gallons)
Jan.	3,092			18	2,547	31	496
Feb.	1,806			1	1,684	19	102
Mar.	1,809			2	1,242	13	552
Apr.	2,572			112	1,835	24	601
May	2,814			60	2,000	52	702
June	3,209			13	3,390	123	-317
July	3,495			0	2,168	67	1,260
Aug.	3,100			0	3,418	85	-403
Sept.	4,104			2	4,937	13	-848
Oct.	4,496			0	2,666	87	1,743
Nov.	4,701			0	1,639	17	3,045
Dec.	4,840			0	1,507	13	3,320
Total	40,038			208	29,033	544	10,253

PART C: POPULATION, SERVICE CONNECTIONS, AND WATER RATES

1. Population served: 670 Estimate the number of persons served directly by your distribution system (Columns 5, 6, and 7).
2. Number of ACTIVE water service connections as of December 31:
   a. 288 Residential
   b. 28 Commercial/Institutional
   c. 1 Blk Meter Industrial
   d. ______ Pasture/Stockwater/Feedlot
   e. ______ Other (specify) ______
   f. 315 **Total ACTIVE Service Connections**
3. If you are a city, how many of the active residential water service connections shown in 2a. are located outside of your city limits. 5
4. Date of last water rate change (Month and Year): 10-01-2001 If rates changed during 2004, please attach a copy of new rate structures that apply to residential users.

PART B: MONTHLY WATER USE SUMMARY

2005 MUNICIPAL WATER USE REPORT (PUBLIC WATER SUPPLY)

CITY OF PRETTY PRAIRIE

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NOTE: REPORT WATER PUMPED, PURCHASED, AND SOLD FOR THE MONTH OF ACTUAL USE. REPORT ALL AMOUNTS IN UNITS OF 1000 GALLONS.

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Column 2: The amount of water purchased, by month, from all other public water supply systems or the Kansas Water Office. Please provide further detail in PART E.

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Column 4: The amount of water sold, by month, to all industrial, pasture, stockwater, feedlot, and bulk water service connections. For rural water districts, include the amount of water sold to farmsteads using at least 200,000 gallons of water per year. Also include metered power plant usage, even if this water is supplied free.

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n.	18,902			42	15,126	276	3,458
b.	15,221			15	16,196	52	-1,042
ar.	18,593			0	13,622	254	4,717
r.	22,269			0	20,610	471	1,188
y	33,300			616	18,687	561	13,436
ne	33,278			0	24,560	755	7,963
ly	43,520			0	33,963	1,391	8,166
g.	39,322			4	41,512	2,334	-4,528
pt.	31,812			0	24,350	830	6,632
t.	28,466			0	23,804	740	3,922
v.	20,369			0	24,440	523	-4,594
c.	20,063			120	15,059	224	4,660
tal	325,115			797	271,929	8,411	43,978

PART C: POPULATION, SERVICE CONNECTIONS, AND WATER RATES

1. Population served: 670 Estimate the number of persons served directly by your distribution system (Columns 5, 6, and 7).

2. Number of ACTIVE water service connections as of December 31:
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   c. 1 Blk Meter Industrial
   d. ______ Pasture/Stockwater/Feedlot
   e. ______ Other (specify) ______
   f. 317 **Total ACTIVE Service Connections**

3. If you are a city, how many of the active residential water service connections shown in 2a. are located outside of your city limits. 5

4. Date of last water rate change (Month and Year): 10/01/2001 If rates changed during 2005, please attach a copy of new rate structures that apply to residential users.

* Assumed all numbers are off by a factor of 10.

PART B: MONTHLY WATER USE SUMMARY

2006 MUNICIPAL WATER USE REPORT (PUBLIC WATER SUPPLY)

CITY OF PRETTY PRAIRIE

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NOTE: REPORT WATER PUMPED, PURCHASED, AND SOLD FOR THE MONTH OF ACTUAL USE. REPORT ALL AMOUNTS IN UNITS OF **1000 GALLONS.**

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Jan.	19,183			184	16,084	216	2,699
Feb.	17,824			71	16,391	209	1,158
Mar.	22,831			23	18,156	404	4,248
Apr.	32,637			30	21,934	681	9,992
May	31,513			0	61.412	636	-30,535
June	33,603			0	61,299	755	-28,451
July	59,824			5	106,245	5,042	-51,468
Aug.	33,746			0	70,284	1,519	-38,057
Sept.	29,764			0	60,693	1,519	-32,448
Oct.	124,622			622	119,719	928	3,353
Nov.	207,760			0	88,642	247	118,871
Dec.	193.230			749	14,042	172	178,267
Total	806,542			1,684	654,901	12,328	137,629

PART C: POPULATION, SERVICE CONNECTIONS, AND WATER RATES We had water main lines break as well as an extremely dry conditions part of the year. Also water tower repair

1. Population served: 670 Estimate the number of persons served directly by your distribution system (Columns 5, 6, and 7).

2. Number of ACTIVE water service connections as of December 31:

   a. 289 Residential
   b. 28 Commercial/Institutional
   c. 1 Bulk meter Industrial
   d. ____ Pasture/Stockwater/Feedlot
   e. ____ Other (specify) ____
   f. 317 Total ACTIVE Service Connections

*Assumed all numbers are off by a factor of 10.

3. If you are a city, how many of the active residential water service connections shown in 2a. are located outside of your city limits. 5

4. Date of last water rate change (Month and Year): 3-01-06 If rates changed during 2006, please attach a copy of new rate structures that apply to residential users.

APPENDIX C

MANUFACTURER'S INFORMATION

- Ion Exchange: Layne Christensen – Advanced Amberpack Municipal Nitrate Removal System
- Ion Exchange: Hungerford & Terry, Inc
- Ion Exchange: Calgon – ISEP

- Ion Exchange: Layne Christensen – Advanced Amberpack Municipal Nitrate Removal System

LAYNE

Schlickbernd, Melissa D.

From: JCBoyd@laynechristensen.com
Sent: Monday, December 03, 2007 10:24 AM
To: Schlickbernd, Melissa D.
Cc: rwredding@laynechristensen.com
Subject: Pretty Prairie, KS
Attachments: Pretty Prairie Site Plan.pdf; Layne Christensen responses to questions for the City of Pretty Prairie.doc

/lelissa,

ᑭlease find attached a layout drawing and Layne's responses to your questions. I believe this was everything you needed, but if ıere is any additional information needed for your report please give me a call.

Sincerely,

ᴊason C. Boyd
Water Treatment Sales Manager
ayne Western-Midwest District
hone 913-573-1613
Fax 913-321-5012
Cell 913-669-3250
boyd@laynechristensen.com

Layne Christensen responses to questions for the City of Pretty Prairie, Kansas

Questions/Information to include:

1. Any pretreatment needed? (See attached water analysis)
   The water will not require any pretreatment ahead of the Layne ion exchange system, based upon the chemistry of the water indicated. We do include an inlet screen with a 100 mesh opening to prevent sand or other particulate from entering the ion exchange system.

2. Percentage of treated versus bypassed flows.
   The amount of water that will be treated verses by-passed is dependent upon the inlet water quality. We ran a projection on the water quality using the 15 ppm Nitrate level and the 20 ppm Nitrate level with the goal of a blended effluent of 5 ppm. The 15 ppm inlet nitrate level will require treating 68% of the incoming water, 237 gpm and by-passing the remaining 113 gpm. The 20 ppm inlet nitrate level will require treating 75% of the incoming water, 264 gpm with the remaining 86 gpm by-passed.

3. Amount of waste produced?
   The amount of waste produced from the Layne Ion Exchange system is projected 0.5% to 0.8% of the total flow, so on a daily basis this can be 2500 to 4000 gallons depending upon the usage and inlet water quality.
   4,000 gpd / 125 gpcd = 32 people equivalent OK-because lagoon designed for 825 people which is ~225 people more from current populat.

4. Characteristics of the waste (i.e. can it be sent to municipal sewer system).
   The waste water from the Layne Ion Exchange System will primarily consist of the spent brine used during regeneration and some of the rinse water. The concentration of the brine will be 6% to 7% NaCl.

5. How is redundancy achieved with your system? Per Kansas Dept of Health & Environment at a minimum it will be required that there are a minimum of two treatment units each treating half of the required treated water capacity.
   Layne's Ion Exchange system will have multiple vessels treating the incoming water stream. To accommodate the higher Nitrate levels anticipated we will provide three vessels. Two of the three vessels will be in service treating the water and the third will be in regeneration or stand-by.

6. Backwash rates, duration, and quantities.
   The ion exchange beds will not require backwashing, but will require regeneration. The regeneration of a vessel will take place every 12-13 hours and will produce 2500 to 4000 gallons per day. This waste can be directed to a holding tank which will slowly discharge this to the local sanitary sewer over the whole day period. ← yes

7. What are the estimated annual chemical requirements and annual chemical costs?

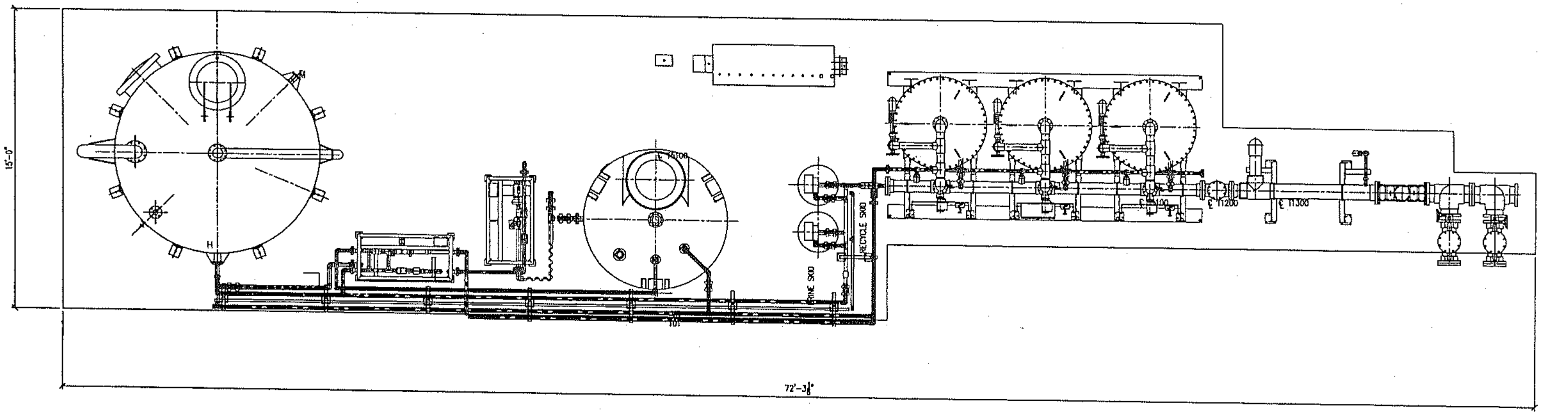
The main chemical used in this process is Sodium Chloride (NaCl) and based upon treating 0.5 mgd, 24 hours per day 7 days per week the annual chemical usage is estimated at 216 tons per year. Using current salt costs of $100.00 per ton this calculates to $21,600.00 per year. The plant will need to take into account the actual percentage utilization to ratio this salt usage and cost. Avg conditions = 6 hours operating per day (about 1/4 of 24 hour operation)
~ $21,600/4 = $5,400 per year

8. Any other operational costs to consider?
The only operating costs will be the waste disposal and the chemicals for the nitrate removal process. The brine for the packed bed system used for regeneration should be softened to prevent calcium sulfate precipitation. The softeners will use a very small amount of brine, when regenerated. The replacement of the ion exchange resin should only be every 6-7 years.

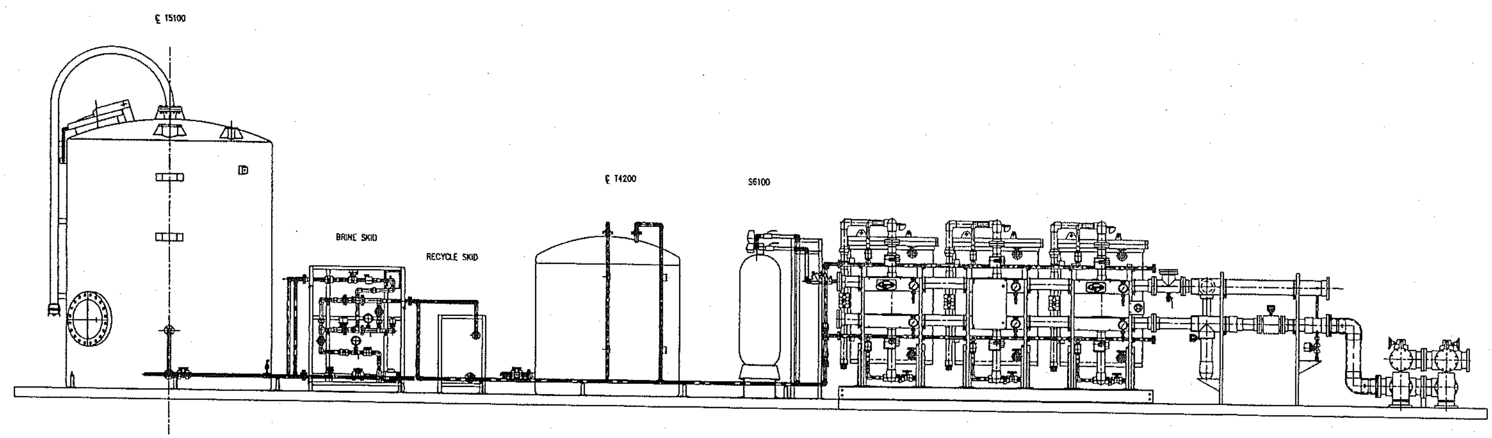
9. Need catalog cuts of your system.

10. Need drawings showing size of components or total footprint required.
The proposed system with treatment vessels, brine system, and recycle tanks will require a space that is 15'x 72'. The attached plot plan shows the three vessel arrangement with the brine tank, recycle tank, and softeners in a single line arrangement. The equipment can be re-arranged to fit into a square configuration..

11. Need budgetary (capital) costs showing everything included with that cost.
Layne Christensen will provide a complete system with the ion exchange units fully skid mounted with the piping, automatic valves, and a common junction box. The other components will include a brine maker, water reclaim tank, recycle pump skid, and abrine pump skid. In addition to the equipment, Layne is recommending Two (2) weeks on-site for system start-up and training, this is to occur after the system has been fully installed, disinfected, and functionally checked out. Layne's budgetary cost for this complete system, FOB Shipping point is <u>$475,000.00</u>.



PLAN
SCALE: [3\8]" = 1'-0"



ELEVATION
SCALE: [3\8]" = 1'-0"

OWNER: CITY OF PRETTY PRAIRIE, KANSAS		
CUSTOMER: WATER AUTHORITY	INSTALLATION LOCATION: KANSAS	
EQUIPMENT TYPE: -	MODEL NO.:	
TITLE: PIPING & EQUIPMENT ARRG'T TYPICAL PACKED BED ION EXCHANGE SYSTEM		
DRAWN BY: LMW DATE: 11/03/06	VESSEL CHK'D. BY: DATE:	PROCESS CHK'D. BY: DATE:
APPROVED BY: DATE:	PIPING CHK'D. BY: DATE:	I&C CHK'D. BY: DATE:
JOB NO. P06-112		
DRAWING NO. 740D6647		
SCALE: AS SHOWN		
SHEET 1	TOTAL 1	REV. 1

97 CHIMNEY ROCK ROAD
BRIDGEWATER, N.J. 08807
PHONE: (732) 469-8720
FAX: (732) 469-7956

LAYNE CHRISTENSEN WATER TREATMENT DIVISION

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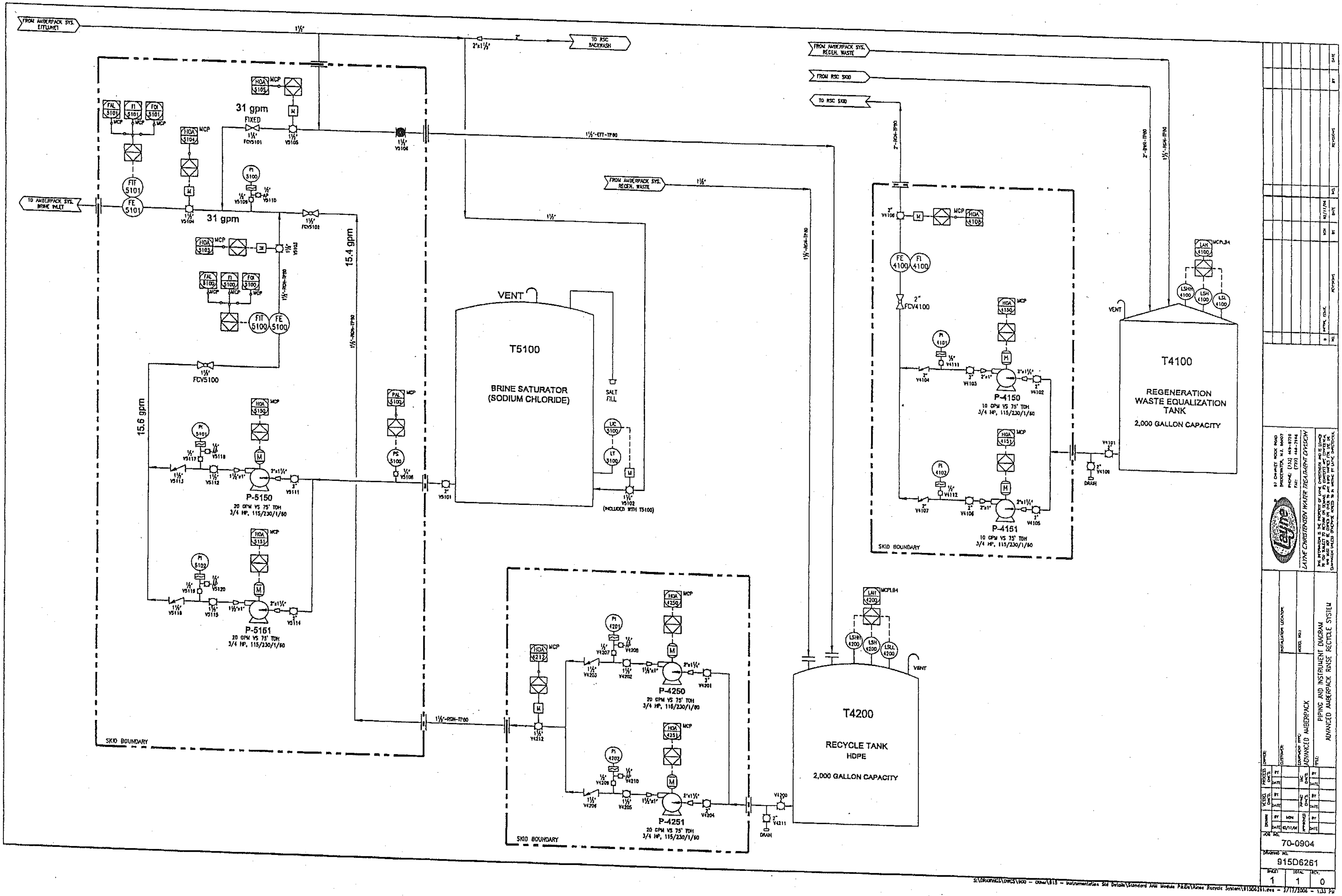
ISSUED FOR APPROVAL

RETURN BY ______

TO MAINTAIN FABRICATION SCHEDULE PLEASE RETURN ONE SET OF PRINTS WITH YOUR APPROVAL BY DATE SHOWN ABOVE OR SHIPMENT MAY BE DELAYED.

NO.	REVISIONS	BY	DATE	NO.	REVISIONS	BY	DATE
0	ORIGINAL ISSUE	LMW	11/03/06				
A	REVIEW	LMW	3/07/07				

S:\DRAWINGS\DWGS\700 – P&ID'S, Piping and Installation Drawings\740 – Plot Plan\740D6647.dwg – Wed, 7 Mar 2007 – 5:15 PM



FROM AMBERPACK SYS. EFFLUENT
TO RSC BACKWASH
FROM AMBERPACK SYS. REGEN. WASTE
FROM RSC 5100
TO RSC 5100
TO AMBERPACK SYS. BRINE INLET
31 gpm
FIXED
FCV5101
V5105
V5106
31 gpm
15.4 gpm
15.6 gpm
FCV5100
P-5150
20 GPM VS 75' TDH
3/4 HP, 115/230/1/60
P-5151
20 GPM VS 75' TDH
3/4 HP, 115/230/1/60
SKID BOUNDARY
VENT
T5100
BRINE SATURATOR
(SODIUM CHLORIDE)
SALT FILL
(INCLUDED WITH T5100)
P-4250
20 GPM VS 75' TDH
3/4 HP, 115/230/1/60
P-4251
20 GPM VS 75' TDH
3/4 HP, 115/230/1/60
SKID BOUNDARY
T4200
RECYCLE TANK
HDPE
2,000 GALLON CAPACITY
VENT
DRAIN
FCV4100
P-4150
10 GPM VS 75' TDH
3/4 HP, 115/230/1/60
P-4151
10 GPM VS 75' TDH
3/4 HP, 115/230/1/60
SKID BOUNDARY
T4100
REGENERATION
WASTE EQUALIZATION
TANK
2,000 GALLON CAPACITY
VENT
DRAIN
LAYNE CHRISTENSEN WATER TREATMENT DIVISION
ADVANCED AMBERPACK
PIPING AND INSTRUMENT DIAGRAM
ADVANCED AMBERPACK RINSE RECYCLE SYSTEM
70-0904
915D6261
1
1
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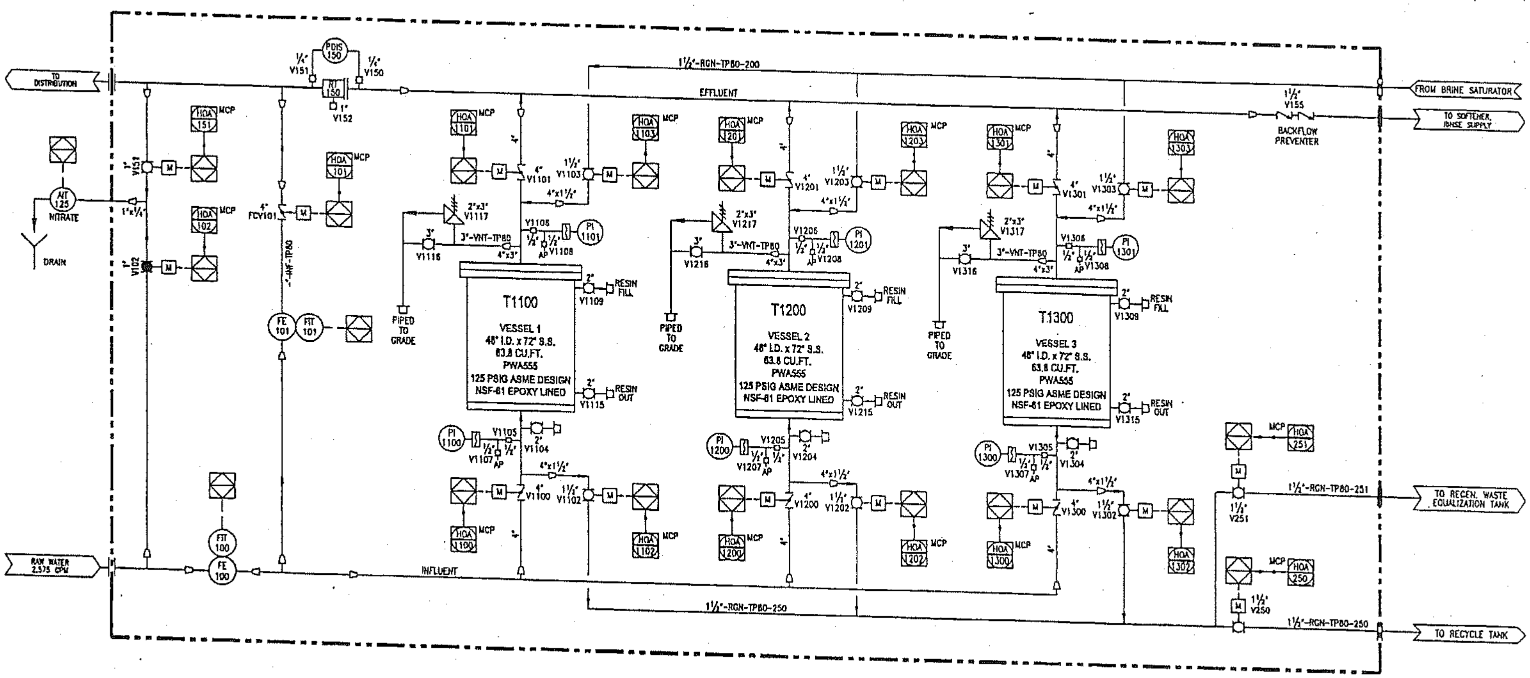


LAYNE CHRISTENSEN WATER TREATMENT DIVISION

EQUIPMENT TYPE: ADVANCED AMBERPACK MUNICIPAL

MODEL NO.: IXS-48.72.SBC

TITLE: PIPING AND INSTRUMENT DIAGRAM

JOB NO. 70-0904

DRAWING NO. 915D6255

SHEET	TOTAL	REV.
1	1	0

- Ion Exchange: Hungerford & Terry, Inc

Schlickbernd, Melissa D.

From: EPECRudy@aol.com
Sent: Tuesday, November 27, 2007 3:08 PM
To: Schlickbernd, Melissa D.
Subject: Re: City of Pretty Prairie, KS - High Nitrates
Attachments: H&T Nitrate Brochure.pdf

HUNGERFORD & TERRY

From Hungerford and Terry...

For a net flow of 347 gpm and a design nitrate level of 25 mg/L as N (projected peak), we would treat 395 gpm with 322 gpm treated and by-pass 73 gpm for a net 347 gpm blended effluent to service of 5 mg/L nitrate as N. We would use three exchangers each sized to treat 50% of the flow. This will provide for continuous uninterrupted flow to service at 347 gpm. Having only two exchangers, each sized for 50% of the flow provides -50% redundancy as you can only treat half the flow during a regeneration of an exchanger. This design using three 50% exchangers provides +50% redundancy as you will always be able to treat 100% of the flow.

What diameter? 54" or 4'-6"

The system will not require any pretreatment other than a bag filter on the influent to reduce any particulate load on the exchanger resin. The hardness is low enough that softening of the regeneration water will not be required. Each exchanger will produce over 163,000 gallons per regeneration for a run time of about 17 hours. A regeneration will produce a waste volume of 3,146 gallons and use 600 lbs. of salt. If it is desirable to reduce the waste volume a portion of the regeneration waste can be recovered and reused by adding a recovery tank and pump. This will reduce the waste volume to 1,659 gallons per regeneration. The waste from a regeneration will have 115mg/L of nitrate as N, 1056 mg/L sulfates as SO4, and 20,000 mg/L TDS. If the waste recovery system is used the waste will contain 2,458 mg/L nitrate as N, 2,256 mg/L sulfates as SO, and 43,000 mg/L TDS. These higher numbers are due to the smaller waste volume as the rinse water that will be recovered and reused will not dilute the solution. Most nitrate systems discharge waste to a sanitary sewer. In California the waste goes into a brine disposal line for discharge to the ocean. We have one customer on Long Island that puts the low conductivity waste into a leach field and has the high conductivity waste hauled off site. In most of the other states it goes to sewer. Sometimes an equalization tank is used to discharge at a low, constant rate so as not to send a slug to the waste treatment plant.

The operating cost will be mostly salt used for regeneration. Two regenerations will produce 403,000 gallons of water with 5 mg/L nitrate. The two regeneration will use 1,200 lbs of salt. Therefore 1,200 lbs of salt will produce 403,000 gallons and at $0.05/lb for salt the operating cost is $0.15/ 1,000 gallons. If the plant is operated at the full flow 24/7 the yearly cost for salt would be $31,141.00. (395 gpm x 60 min/hr. x 24 hrs/day x 365 days/year divided by 1,000 x $0.15 / 1,000 gals = $31,141.00). Power consumption is relatively low. There are brine pumps, an air blower, and the reclaim pump if the waste recovery system is used. These are all small HP pumps and run less than 2 hours being 120 gpm for fast rinse and the lowest rate 24 gpm for brine injection. (395gpm x 60min/hr x 6hrs/day x 365days/yr)/(1,000 x 0.15/1,000) = $7,785

Our typical system would include the exchanger tanks, resin beds, automatic butterfly valves, system piping including interconnecting piping between the tanks, and regeneration piping, a bulk brine maker, brine pumps with associated valves, piping and instrumentation, an on-line nitrate analyzer, meters, air blower and air piping and valves, and a PLC control panel with an operator interface terminal. If the waste recovery system is included we supply the tank, pump, associated valves and piping and a conductivity monitor. The budget price for a system like this would be in the $600,000.00 range including delivery to the site.

Include waste recovery system? Yes
Include bag filter? Yes

Attached is a copy of our nitrate removal bulletin explaining the advantages and benefits of our process.

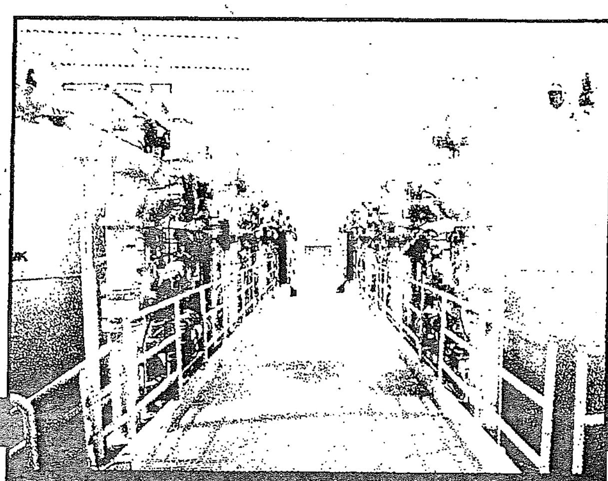
Please let me know if you have any questions or require any additional information.

Best Regards,

Michael Rudy
Environmental Process Equipment Company
250 N. Rock Road; Suite 118-253
Wichita, KS 67226
Phone: 316-866-2888
Fax: 316-866-2779
Mobile: 316-305-7839

The Hungerford & Terry Nitrate Removal System:

A high capacity, efficient method for removal of nitrate from water.



12,000 GPM Countercurrent Regenerated system operating in Illinois

Nitrate - An unwelcome Addition to your water

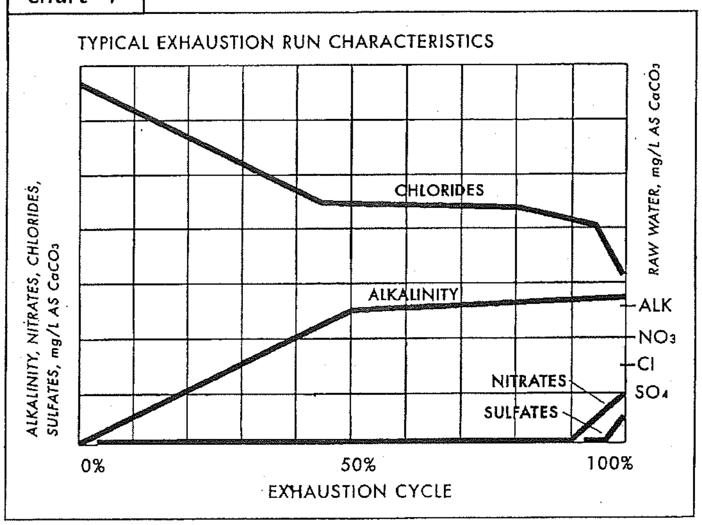
One of the compounds of most concern in water in recent years is nitrate. The contamination of groundwater and, in some instances, surface water, by nitrates can be caused by fertilizer run-off in agricultural areas, septic tank field percolation and land disposal of wastes. In high concentrations, nitrates pose severe health risks to people, especially infants, and livestock.

Nitrate Removal Process

Federal Primary Drinking Water Standards, established by the Environmental Protection Agency, restrict the nitrate level in water to 10 mg/L. H & T's countercurrent nitrate removal system easily reduces nitrates to a level much lower than that permitted by Federal standards.

Our system reduces the nitrate level in water through a chloride cycle anion exchange. The nitrates, alkalinity and sulfates are exchanged for chlorides on strongly basic anion exchange resin *(see chart #1)*. The exchange capacity is largely governed by the concentrations of nitrates and sulfates, which are effectively retained until breakthrough. Alkalinity and chlorides have little effect. Initially, the bicarbonate alkalinity is removed by the anion resin but is re-exchanged (released) later in the exhaustion cycle.

chart #1



During the service run the chemical reaction is:

$$RCl + NaNO_3 = RNO_3 + NaCl$$

During regeneration the reaction is:

$$RNO_3 + NaCl = RCl + NaNO_3$$

where R denotes the anion exchange resin

System Design

The Hungerford & Terry team of engineers has designed and tested two types of systems to meet your nitrate removal needs. We recommend the countercurrent removal system for most facilities because it is the most efficient in design and operation *(see chart #3 on back cover)*. However, if your system is small and capital costs are of greater concern, the cocurrent system may be best for your operation.

Countercurrent Operation

Because the concentration of nitrates leaving the anion exchanger in the Hungerford & Terry system is much lower than 10 mg/L, a portion of untreated water can bypass the unit. This raw water, which contains high levels of nitrates, is then blended with the treatment system effluent to produce a final product with nitrate concentrations to any desired level below the 10 mg/L requirement.

The H & T system uses countercurrent regeneration to attain the lowest possible leakage from the exchanger, allowing a larger portion of water to bypass the treatment process. Our goal is to develop treatment plants that are smaller and more efficient than the conventional cocurrently regenerated systems.

Additionally, nitrate leakage from a countercurrently regenerated system is one-quarter to one-tenth the leakage from a cocurrently regenerated system. In the countercurrent system, the brine injection and slow rinse water are introduced at the bottom of the exchanger and flow upward through the compacted ion exchange resin bed *(see chart #2)*. The resin at the bottom of the bed, which is the last resin the service water contacts, is the most fully regenerated. This results in the lowest possible nitrate leakage at nominal regeneration levels.

Countercurrent Regeneration

As the resin in the exchanger becomes exhausted, nitrates will begin to increase in the treated water. To insure efficient operation, the exchanger must be regenerated after every service run.

Step 1 – Backwashing
The resin is washed to remove suspended matter collected in the resin bed and to loosen and classify the resin bed. The wash process should continue until the waste water is relatively clear.

Step 2 – Brine Injection
Nitrates and sulfates are removed from the ion exchange resin by passing a pre-determined 6% to 8% brine solution through the resin bed. During this step dilute brine enters the bottom of the exchanger. The spent brine exits the exchanger at the regenerant collector located at the top of the resin bed.

Step 3 – Slow Rinse
The slow rinse step flushes out the bulk of the brine. This provides another 10 to 15 minutes of brine contact time with the resin, insuring thorough nitrate/sulfate removal.

Step 4 – Fast Rinse
The downflow fast rinse removes the last traces of nitrate and sulfate as well as any excess brine from the resin.

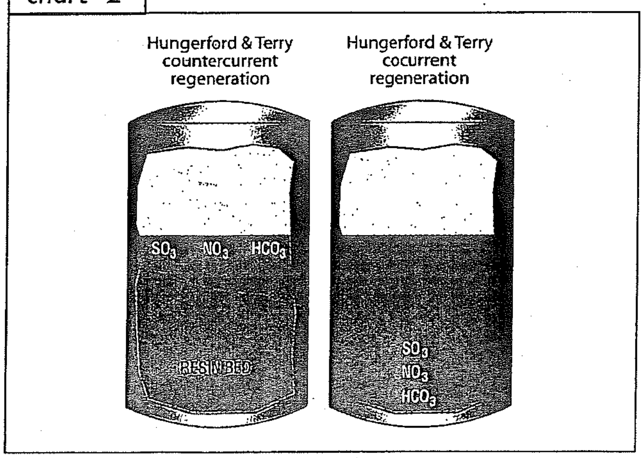
Cocurrent Operation

The cocurrently regenerated nitrate removal system utilizes the same principles of operation and chemistry as the countercurrent system. However, instead of the regenerant brine flowing up from the bottom of the bed to the top, the brine is introduced at the top of the bed and flows down through the bed in the same manner as the water during the service run.

Cocurrent Regeneration

Since the regeneration is also downflow, it is necessary to backwash a cocurrently regenerated system after every service run in order to remove suspended matter and relieve compaction. Following a downflow service run, the regeneration sequence would be: upflow backwash, downflow brine injection, downflow slow rinse and downflow fast rinse.

chart #2



Treated Water Characteristics

During the exhaustion cycle, nitrates, sulfates and alkalinity are exchanged for chlorides. The pH during the first part of the run is approximately 4.5 because the bicarbonate ion, with its buffering effect, has been removed from the treated water. There will be some nitrate leakage (usually less than 0.5 mg/L for countercurrent), depending on the concentration of nitrates in the raw water and the regeneration level. The sulfates will be essentially zero.

As the run progresses, the alkalinity will increase to its original level or higher. Nitrates and sulfates will continue to be removed. At the end of the cycle, nitrate leakage increases, followed shortly by an increase in sulfates. Throughout the run, the total concentration of anions does not change. Also, the cation concentration in the raw water remains the same.

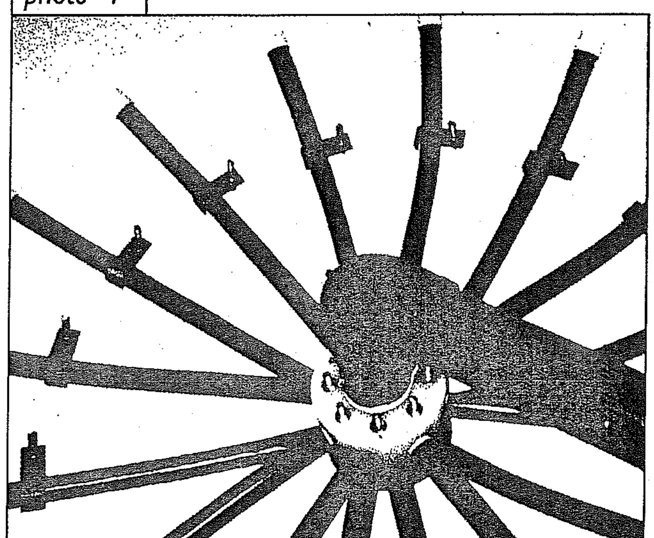
Equipment Design

Innovative, custom design equipment gives Hungerford & Terry a leading edge in the water purification business. The nitrate removal system is one example of how our company responds to the needs of our current and prospective customers by providing safe, reliable equipment.

A series of automated valves is used in the operation of the nitrate removal system. Valve actuation can be pneumatic, hydraulic or electric depending on the type of valve needed and our customer's preferences. H & T nitrate removal tanks are built of welded steel plate in accordance with Section VIII of the ASME Code. Non-code construction is also available where acceptable. Tanks are normally unlined with structural leg supports, a 12" x 16" manhole and prime painting. Tank linings, adjustable jack legs, larger manholes and special painting can also be provided as customer's needs dictate.

The underdrain of a typical countercurrent regenerated exchanger uses a hub-curved radial lateral design *(see photo #1)*. It is constructed of schedule 80 PVC and consists of laterals curved to follow the contour of the exchanger bottom head. This eliminates the possibility of "brine hide-out" below the underdrain. The regenerant collector and inlet distributor are of the header lateral design and incorporate sufficient supports to resist all forces exerted on the distributors during service and regeneration steps.

photo #1



Hub - Curved Radial Lateral Underdrain Distributor

All automatic control panels used for automatic or semi-automatic operation of the nitrate removal systems, are designed, fabricated, wired and tested in our Clayton, New Jersey plant. Because we do not use subcontractors, we have complete control over design and quality.

The units, equipped with individual valves, can be designed for fully or semi-automatic operation. Additionally, many special types of control panels can be developed for either single or multiple unit installations.

Ordinarily, automatic controls use a contact meter head with an automatic reset counter which can easily be adjusted for a wide range of capacities. These controls can also be designed for installations requiring an alarm dial meter with adjustable, automatic reset registers.

Semi-automatic control panels require push-button initiation of the regeneration cycle. An alarm dial, alarm bell or warning light is used to signal the operator that the unit has reached the end of its nitrate removal capacity and requires regeneration. By pressing the start botton, the control circuit is energized to automatically operate the individual control valves.

Brine Tanks and Regeneration Systems

In general, nitrate removal units are equipped with one of the following brine tank and regeneration systems:

1. A single fiberglass combination saturator-measuring tank with gravel bed, collection system, brine transfer pump, and required valves and float gauge to indicate the correct amount of brine. Galvanized steel or unlined brine tanks are also available.
2. If large quantities of salt are consumed, a bulk salt saturator may be the best option. Saturated brine is pumped from the bulk saturator, sized to hold a truckload or carload of salt, directly to the exchanger units.

Alternative units can be developed to meet special requirements.

Accessories

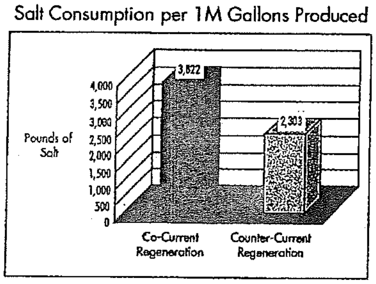
Each exchanger is equipped with pressure gauges to indicate loss of head at various flow rates. Automatic backwash and brine rinse rate controls are used in an open sump or closed pressure drain system. Each system is also equipped with sampling cocks and a nitrate test kit.

chart #3

Case Study:	*Vernon Texas*
Process:	Nitrate Reduction
Production:	5.6 MGD

	Influent Raw Water	*Blended Effluent Requirement*
Nitrates	18 mg/L	8mg/L

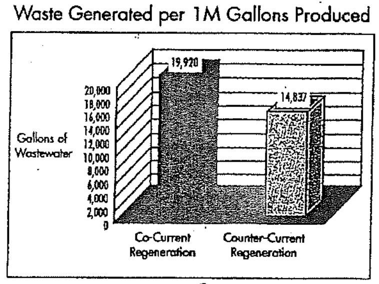
Salt Consumption per 1M Gallons Produced



Annual Savings:

3.1 Million Pounds

Waste Generated per 1M Gallons Produced



Annual Savings:

10.4 Million Gallons

References

- Borough of Clayton – Clayton, New Jersey
- Borough of Greencastle – Greencastle, Pennsylvania
- California Dept. of Corrections – Chino, California
- Campbell Soup Company – Napolean, Ohio
- City of Decatur – Decatur, Illinois
- City of Des Moines – Des Moines, Iowa
- City of Plover – Plover, Wisconsin
- City of Vernon – Vernon, Texas
- Consumers Illinois Water Co. – Danville, Illinois
- County of Suffolk Department of Health Services – Long Island, New York
- Town of Bridgewater – Brigdgewater, Massachusetts
- Village of Blissfield – Blissfield, Michigan
- Village of Whitting – Whitting, Wisconsin
- Vlasic Foods – Millsboro, Delaware
- Warwick Township – Lancaster County, Pennsylvania

H&T INC. PURE WATER Since 1909

HUNGERFORD & TERRY, INC.
226 Atlantic Ave. • PO Box 650
Clayton, New Jersey 08312-0650 USA
Tel: 856.881.3200 • Fax: 856.881.6859
email: sales@hungerfordterry.com

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- Ion Exchange: Calgon – ISEP

CALGON CARBON

Schlickbernd, Melissa D.

From: cdrewry@calgoncarbon-us.com
Sent: Wednesday, November 21, 2007 11:30 AM
To: Schlickbernd, Melissa D.
Subject: Calgon Pretty Prairie Response

Attachments: Calgon Carbon Response.doc; Calgon Carbon Budgetary Summary PA.xls

Calgon Carbon Response.doc (38... Calgon Carbon Budgetary Summar..

Melissa,

Please feel free to call if you have any questions, assume same footprint requirements as Conway Springs Project. Pretty Prairie ISEP will not have bypass system.

Regards,

Charles Drewry
Sales Manager ISEP/IX
Office/Cell 352 467 0103
Fax 352 567 7741

Please Note: My email address has changed to "cdrewry@calgoncarbon-us.com"

(See attached file: Calgon Carbon Response.doc)(See attached file: Calgon Carbon Budgetary Summary PA.xls)

Project: City of Pretty Prairie, Kansas

Summary: The City's existing groundwater wells have continuously exceeded the EPA maximum contaminant level of 10mg/l for nitrate. It is assumed that RO and electrodialysis are not feasible treatment option when compared to ion exchange.

Treatment Plant Capacity of 0.50 MGD (347 gpm)

*** Please take into account any inefficiency in the treatment system. If the plant capacity needs to be increased to offset any inefficiency please do so and make note of it so that I see what the treatment plant capacity needs to be in order to utilize your treatment system and end up with a throughput of 0.50 MGD. Also please state any assumed percentages of treated versus bypassed flows.

Current Raw Water Characteristics
Average Nitrate = 15 mg/l
Peak Nitrate = 20 mg/l

Projected Raw Water Design Parameters (assumes nitrates will continue to increase)
Average Nitrate = 20 mg/l
Peak Nitrate = 25 mg/l

Finished Water Design Parameters
Effluent Nitrate = 5 mg/l (max)

Questions/Information to include:

1. Any pretreatment needed? (See attached water analysis) Pre filter to remove any solids, also what pH range can the water system handle, slight drop of pH will occur.

2. Percentage of treated versus bypassed flows. Will treat 100 % of flow, because ISEP is continouous a preset amount on N breakthrough can be attained without the need for a bypass system.
3. Amount of waste produced? .28%
4. Characteristics of the waste (i.e. can it be sent to municipal sewer system). Yes, 7% brine solution, with nitrates and sulfates
5. How is redundancy achieved with your system? Per Kansas Dept of Health & Environment at a minimum it will be required that there are a minimum of two treatment units each treating half of the required treated water capacity. The ISEP units have 30 cells with 24 cells utilized for removal of nitrates the remaining 6 cells regenerate the resin. ISEP's are currently permitted and operating in Kansas
6. Backwash rates, duration, and quantities. ISEP is a continouous process, waste numbers above reflect quantaties.
7. What are the estimated annual chemical requirements and annual chemical costs? Approx 3# of salt used for every 1000 gallons of water produced.
8. Any other operational costs to consider?
9. Need catalog cuts of your system. Attached

500,000 gals/day × 3 lbs / 1,000 gals
= 1500 lbs/day × 365 days / 1 year
= 547,500 lbs/yr × $0.05/lb
= $27375 /...

WCI File No. 07-200-523-00

10. Need drawings showing size of components or total footprint required.
11. Need budgetary (capital) costs showing everything included with that cost. $985,000.00, same footprint as Conway Springs but no bypass.

Very High!

Please provide as much of this information as possible by Thursday, November 21st. If you have any questions or comments call me at 785-827-0433.

Mainly because of KDHE's redundancy req't which means 2 turntables!

Thanks,
Melissa Schlickbernd, P.E.
Wilson & Company, Inc., Engineers & Architects

CALGON CARBON CORPORATION

To: Bosak, T.
cc: RUS, Drewry, C.
From: Josh Palyo

November 12, 2007

Project #: P-IS-07139 - BUDGETARY
Salesman: Drewry, C.
Company: City of Pretty Prairie
Process: Nitrate Removal
Revision: PA
Date Required:

Model #: **TC-1518-130-1.00**

Other Info:

Indoor/Outdoor:	**Indoors**
min/max atmospheric temp:	**5 to 40 °C (41 to 104°F)**
Hazardous Location:	**Assume Non rated**
Seismic Zone:	**BOAC Zone 2**
Height/Space Restrictions:	**Assume None**
Non-Standard Testing:	**Assume None**
Customer Spec's:	**Assume None**
Non-Standard CCC "T's & C's":	**Assume None**
Design Wind Speed:	**None, Indoors**
Site Elevation:	**Assume less than 2,000 m (6,562 ft)**
Power Available:	**Assume 110/120, 50/60 Hz, 1Ø** **220/240, 50/60 Hz, 3Ø**
Engineering Firm:	**Assume NONE**
Process Guarantee:	**Assume NONE**

CALGON CARBON CORPORATION	CLIENT:	City of Pretty Prairie	DATE:	November 12, 2007
	PROCESS:	Nitrate Removal	REVISION:	PA
	MODEL NUMBER:	TC-1518-130-1.00	LOCATION:	Pretty Prairie, KS
	NUMBER OF UNITS:	Two		
	PROJECT NUMBER:	P-IS-07139 - BUDGETARY		

Process Specification

Total Flow Rate	347	gpm	79	m3/hr
Feed Density	1.0	g/ml		
Feed Viscosity	1.0	cP		
Operating Temperature	77	°F	25	°C
Design Temperature	95	°F	35	°C
Inlet Concentrations				
Nitrate (NO_3)	111	ppm as NO_3	25	ppm as N
Sulfate (SO_4)	23	ppm		
Chloride (Cl)	8	ppm		
Outlet Concentrations				
Nitrate (NO_3)	22	ppm as NO_3	5	ppm as N

Port allocation	Ports	Passes	BV	gpm	m3/hr
Adsorption	22	1	357.00	347	78.81
Rinse	4	4	1.00	0.97	0.22
Regeneration (mixed)	3	3	1.41	1.37	0.31
Displacement / Backwash	1	1	1.50	1.46	0.33
Total	**30**				

Resin Type	Purolite A530E			
Resin Capacity (theoretical)	0.90 g eq/l			
Available Capacity	0.51 g eq/l			
Feed Velocity	46.6 BV/hr			
Resin Rate	1.0 gpm	0.22 m3/hr		
Treatment Ratio	357			
Resin Volume	226 ft3	6.4 m3		
Rotation Time	29.0 hr/rev			
Step Time	58.1 min/step			

Regenerant	NaCl		
Regen Concentration	26%		
Regen Density	1.20 g/ml		
Regen Consumption	8.00 lbs/ft3	128.3 kg/m3	
NaCl (100%)	62 lbs/hr	28 kg/hr	0.75 tons/day
NaCl (26%)	0.40 gpm	0.09 m3/hr	

ISEP Waste	0.98 gpm	0.283 % Waste

Assume 8-hour operating day

$0.98 \text{ gpm} \times \frac{60 \text{ min}}{1 \text{ hr}} \times \frac{8 \text{ hrs}}{\text{day}} = 470.4$ gpd of waste to sewer lagoons

Per lagoon study, assume 125 gpcd for WW flow

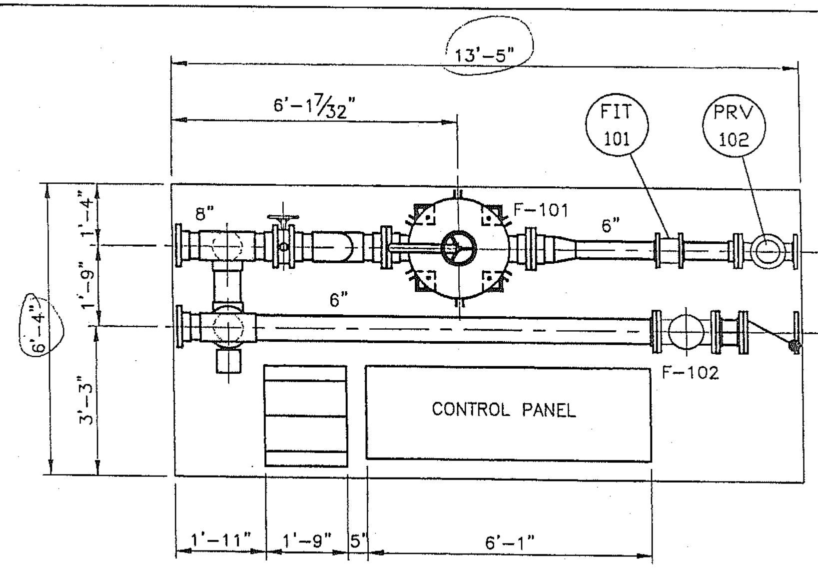
470.7 gpd / 125 gpcd ~ 4 people's worth of WW flow

∴ Okay – lagoons can handle

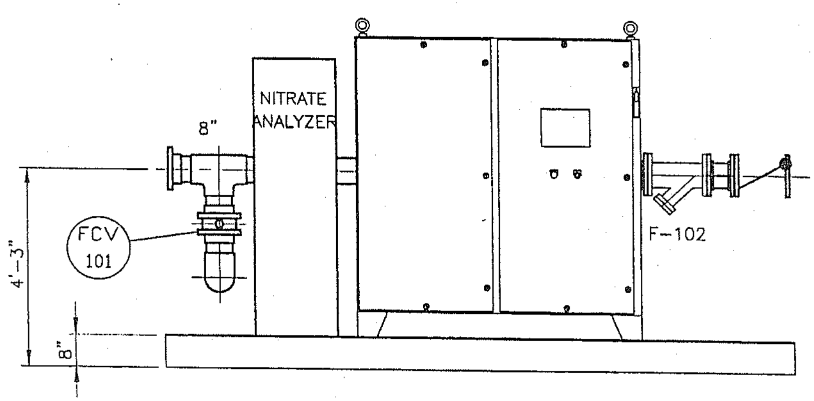
CALGON
CALGON CARBON CORPORATION

CLIENT:	City of Pretty Prairie	DATE:	November 12, 2007
PROCESS:	Nitrate Removal	REVISION:	PA
MODEL NUMBER:	TC-1518-130-1.00	LOCATION:	Pretty Prairie, KS
NUMBER OF UNITS:	Two		
PROJECT NUMBER:	P-IS-07139 - BUDGETARY		

	CHANGES	PROCESS SCOPE OF WORK DEFINITION	SCOPE OF SUPPLY CCC	SCOPE OF SUPPLY CLIENT	NOTES
PRIMARY FEED STREAMS		347.0 gpm Feed /			
		1.0 cP / 1.00 SG /			
		26% NaCl			
MAXIMUM OPERATING CONDITIONS		77°F at 75 psig			
DESIGN CONDITIONS		95°F at 100 psig			
MODULE 10 - CELLS			X		
CELL SIZE		457 mm dia. x 1651 mm / 18 in. dia. x 65 in.			
CELL STACKING		30 per unit stacked 1 high (staggered)			
CELL MATERIAL of CONSTRUCTION		PE Lined FRP			
RESIN VOLUME / CELL VOLUME		0.214 m3 resin per cell / 0.235 m3 total cell volume			
		7.55 ft3 resin per cell / 8.30 ft3 total cell volume			
RESIN TYPE		Purolite A530E		X	
		6.41 m3 resin total / 226 ft3 resin total		X	
RESIN LOADING				X	
TOP/BOTTOM NOZZLES		6" Flg			
RESIN FILL/RESIN DUMP		None			
MANWAY		None			
SIGHT GLASS		None			
DISTRIBUTORS		Hub-Radial	X		
TYPE/DESCRIPTION		5 x 6.89" Radials (2.0" OD / 0.83" ID / 5 Sections)			
MATERIAL		PP AZS			
SLOT SIZE		70 Mesh Top and Bottom			
MODULE 20 - VALVE			X		
PORT SIZE / CONFIGURATION		1.00" / 30-30 Configuration			
MATERIAL OF HEADS		Hast C / Polypropylene			
STATIONARY CONNECTION		1.00" Threaded NPSM			
ROTATING CONNECTION		1.50" Sanitary			
OVERLAP / SEAL		Standard Overlap (20%)			
SUPPORT STEEL/ACCESS PLATFORM		CCC TO PROVIDE SKETCH ONLY		X	
SPECIAL VALVE REQUIREMENTS		NONE			
MODULE 25 - CONTROLS			X		
SITE CLASSIFICATION		STANDARD			
EXPLOSION PROOF		NO			
PLC / CONTROL PANEL		STANDARD	X		
MOTORS / SPEED CONTROLLERS		STANDARD	X		
ENCODERS / PROXIMITY / KILL SWITCHES		STANDARD	X		
ELECTRICAL POWER / TRANSFORMER		220 VAC, 3 Ø, 50/60 Hz			
SPECIAL CONTROL REQUIREMENTS		NONE			
MODULE 30 - PIPING					
STATIONARY HOSES / END FITTINGS		60 x 1.00" TFE Lined / PP Threaded NPSM	X		
STATIONARY JUMPERS		1.00" CPVC	X		
STATIONARY HEADERS		4.00" CPVC	X		
ROTATING HOSES / END FITTINGS		60 x 1.50" TFE Lined / Sanitary Flanged	X		
ROTATING HARD PIPE		1.50" CPVC	X		
INSULATION		NONE		X	
GASKETS		EPDM	X		
SPECIAL PIPING REQUIREMENTS					
MODULE 35 - TURNTABLE			X		
TURNTABLE SIZE / TYPE		15 ft diameter			
SPEED RANGE		4 to 40 hrs/rev			
TURNTABLE FOUNDATION		CCC to provide loads only		X	
SPECIAL TURNTABLE REQUIREMENTS		NONE			
MODULE 40 - AUXILIARY EQUIPMENT					
TANKS / PUMPS		Auxiliaries NOT included		X	
AUXILIARY CONTROLS / ANALYZERS		Auxiliaries NOT included		X	
FILTERS / STRAINERS		Auxiliaries NOT included		X	



PLAN



ELEVATION

REV	DESCRIPTION	APP	DATE
C			
B			
A			

REVISIONS

TOLERANCES (unless otherwise specified)

ANGULAR	±0°30'	DECIMAL (2 PLACES)	±.010
FRACTIONAL	±1/16"	DECIMAL (3 PLACES)	±.005
DECIMAL (1 PLACE)	±.015	DECIMAL (4 PLACES)	±.0005

CALGON

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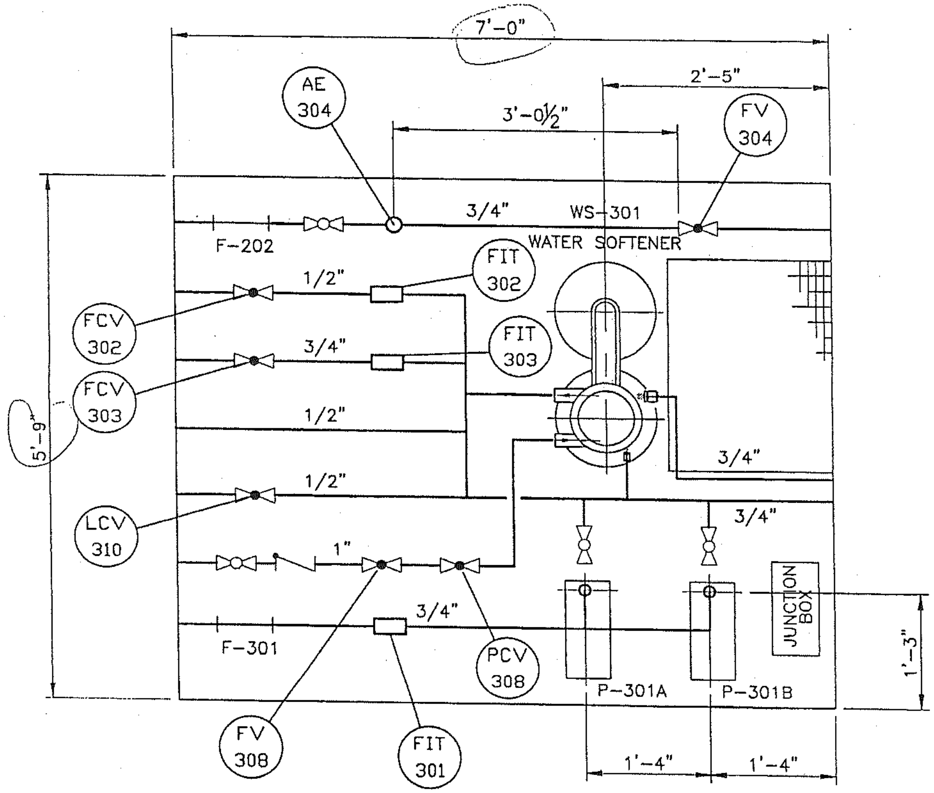
	NAME	DATE
DRAFTER	RES	04/07/03
DESIGNER		
CHECKER		
APPROVAL		
PROJECT No.	P-IS-03032	

CLIENT ~~CITY OF CONWAY SPRINGS~~

TITLE RAW WATER AND TREATED WATER SKID GENERAL ARRANGEMENT

DWG. Size	SHEET No.	SCALE
B	1 OF 1	NTS

DWG. No.	REV.
GA-001	A



PLAN

REV	DESCRIPTION	APP	DATE
C			
B			
A			

REVISIONS

TOLERANCES (unless otherwise specified)

ANGULAR	±0°30'	DECIMAL (2 PLACES)	±.010
FRACTIONAL	±1/16"	DECIMAL (3 PLACES)	±.005
DECIMAL (1 PLACE)	±.015	DECIMAL (4 PLACES)	±.0005

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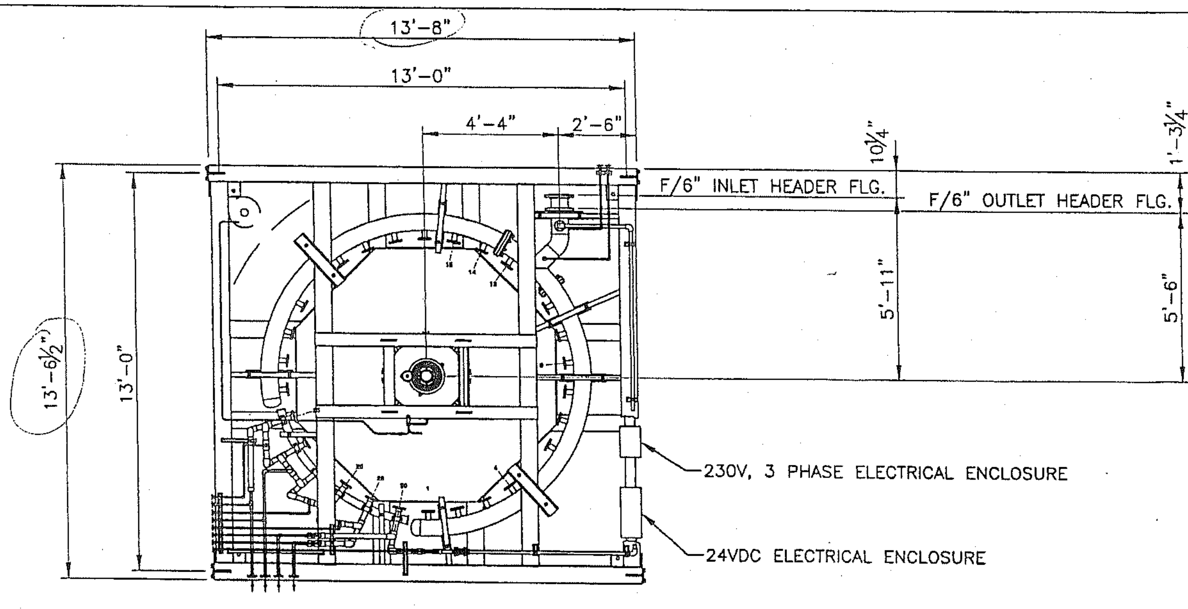
	NAME	DATE
DRAFTER	RES	04/07/03
DESIGNER		
CHECKER		
APPROVAL		
PROJECT No.	P-IS-03032	

CLIENT ~~CITY OF CONWAY SPRINGS~~

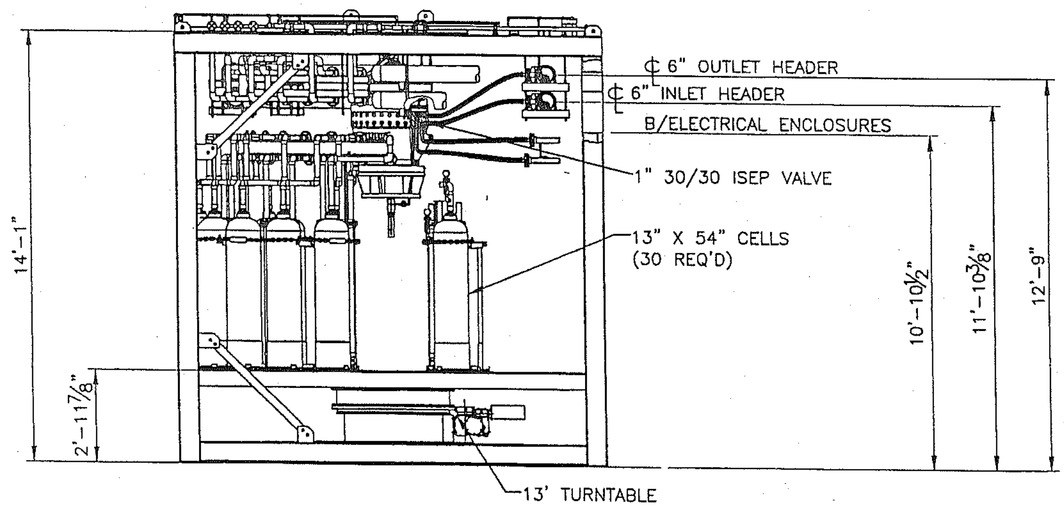
TITLE WATER SOFTENER AND BRINE CONTROL SKID GENERAL ARRANGEMENT

DWG. Size	SHEET No.	SCALE
B	1 OF 1	NTS

DWG. No. GA-002 REV. A



PLAN



ELEVATION

REV	DESCRIPTION	APP	DATE
C			
B			
A			

REVISIONS

TOLERANCES (unless otherwise specified)

ANGULAR	±0°30'	DECIMAL (2 PLACES)	±.010
FRACTIONAL	±1/16"	DECIMAL (3 PLACES)	±.005
DECIMAL (1 PLACE)	±.015	DECIMAL (4 PLACES)	±.0005

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	NAME	DATE
DRAFTER		
DESIGNER		
CHECKER		
APPROVAL		
PROJECT No.	P-IS-03032	

CLIENT ~~CITY OF~~ ~~CONWAY SPRINGS~~

TITLE 1" 30/30 ISEP VALVE
13 FOOT TURNTABLE
30 – 13" X 54" CELLS

DWG. Size B | SHEET No. 1 OF 1 | SCALE NTS

DWG. No. GA-003 | REV. C

APPENDIX D

WATER UTILITY FUND BUDGETS
(2000 – 2008)

FUND PAGE FOR FUNDS WITH NO TAX LEVY

2002 Budget

Adopted Budget Special Highway	Prior Year Actual 2000	Current Year Estimate 2001	Proposed Budget Year 2002
Unencumbered Cash Balance Jan 1	6,891	223	182
Receipts:			
State of Kansas Gas Tax	2,631	2,660	2,700
City County Highway Fund	18,443	18,770	18,500
Other	20	0	
Interest on Idle Funds	0	0	
Total Receipts	**21,094**	**21,430**	**21,200**
Resources Available:	**27,985**	**21,653**	**21,382**
Expenditures:			
Personal	2,580	5,000	5,000
Contractual	12,846	4,000	4,000
Commodities	2,288	3,000	3,000
Capital Outlay	3,048	2,000	2,000
Street Improvements	7,000	7,471	7,382
Total Expenditures	**27,762**	**21,471**	**21,382**
Unencumbered Cash Balance Dec 31	223	182	0

Adopted Budget

Water Utility Fund	Prior Year Actual 2000	Current Year Estimate 2001	Proposed Budget Year 2002
Unencumbered Cash Balance Jan 1	0	0	0
Receipts:			
Water Sales	69,968	68,000	80,000
Water Sales Tax	707	680	800
Connections	315	350	500
Misc.-Meters, Grant Funds	1,423	350	500
Transfer of funds	304	0	0
Interest on Idle Funds	0	0	0
Total Receipts	**72,717**	**69,380**	**81,800**
Resources Available:	**72,717**	**69,380**	**81,800**
Expenditures:			
Personal	17,559	20,000	21,000
Contractual	16,951	10,000	17,000
Commodities	5,160	4,800	5,000
Capital Outlay	1,035	19,580	3,800
Bond & Interest	0	0	0
Transfer of Funds to P & I	0	0	0
Transfer of Funds to Water/Sewer	32,012	15,000	35,000
Total Expenditures	**72,717**	**69,380**	**81,800**
Unencumbered Cash Balance Dec 31	0	0	0

FUND PAGE FOR FUNDS WITH NO TAX LEVY

Adopted Budget

Special Highway	Prior Year Actual 2001	Current Year Estimate 2002	Proposed Budget Year 2003
Unencumbered Cash Balance Jan 1	223	1,890	1,708
Receipts:			
State of Kansas Gas Tax	2,588	2,700	0
City County Highway Fund	18,075	18,500	17,350
Interest on Idle Funds			
Total Receipts	**20,663**	**21,200**	**17,350**
Resources Available:	**20,886**	**23,090**	**19,058**
Expenditures:			
Personnel	3,582	5,000	5,000
Contractual	3,002	4,000	4,000
Commodities	102	3,000	3,000
Street Improvements	12,310	9,382	7,058
Total Expenditures	**18,996**	**21,382**	**19,058**
Unencumbered Cash Balance Dec 31	1,890	1,708	0

2003 Budget

Adopted Budget

Water Utility Fund	Prior Year Actual 2001	Current Year Estimate 2002	Proposed Budget Year 2003
Unencumbered Cash Balance Jan 1	0	0	0
Receipts:			
Water Sales	71,278	80,000	80,000
Water Sales Tax	720	800	800
Connections	330	500	500
Misc.-Meters, Grant Funds	0	500	500
Transfer of Funds	4,919	0	0
Interest on Idle Funds			
Total Receipts	77,247	**81,800**	**81,800**
Resources Available:	77,247	**81,800**	**81,800**
Expenditures:			
Personal	19,542	21,000	21,000
Contractual	23,018	17,000	17,000
Commodities	8,240	5,000	5,000
Capital Outlay	2,860	3,800	3,800
Transfer to Water/Sewer Fund	23,588	35,000	35,000
Total Expenditures	77,247	**81,800**	**81,800**
Unencumbered Cash Balance Dec 31	0	0	0

Pretty Prairie

FUND PAGE FOR FUNDS WITH NO TAX LEVY

Adopted Budget Special Highway	Prior Year Actual 2002	Current Year Estimate 2003	Proposed Budget Year 2004
Unencumbered Cash Balance Jan 1	1,889	2,556	848
Receipts:			
State of Kansas Gas Tax	11,916	0	21,190
County gas tax	9,041	17,350	10,000
Interest on Idle Funds	0	0	0
Total Receipts	**20,957**	**17,350**	**31,190**
Resources Available:	**22,846**	**19,906**	**32,038**
Expenditures:			
Personnel	5,154	5,000	6,000
Contractual	1,380	4,000	5,000
Commodities	4,741	3,000	5,000
Street Improvements	9,015	7,058	16,000
Total Expenditures	**20,290**	**19,058**	**32,000**
Unencumbered Cash Balance Dec 31	2,556	848	38

Adopted Budget

Water Utility Fund	Prior Year Actual 2002	Current Year Estimate 2003	Proposed Budget Year 2004
Unencumbered Cash Balance Jan 1	0	0	0
Receipts:			
Water Sales	72,964	80,000	80,000
Water Sales Tax	724	800	800
Connections	390	500	500
Misc., Meters, Grant Funds	0	500	500
Transfer of Funds	0	0	0
Interest on Idle Funds			
Total Receipts	**74,078**	**81,800**	**81,800**
Resources Available:	**74,078**	**81,800**	**81,800**
Expenditures:			
Personnel	23,361	21,000	21,000
Contractual	15,915	17,000	17,000
Commodities	4,924	5,000	5,000
Capital Outlay	0	3,800	3,800
Transfer to Water/Sewer Fund	29,878	35,000	28,125
1999 Project Fund Bond Retirement	0	0	6,875
Total Expenditures	**74,078**	**81,800**	**81,800**
Unencumbered Cash Balance Dec 31	0	0	0

Pretty Prairie

FUND PAGE FOR FUNDS WITH NO TAX LEVY

Adopted Budget Special Highway	Prior Year Actual 2003	Current Year Estimate 2004	Proposed Budget Year 2005
Unencumbered Cash Balance Jan 1	2,556	4,106	1
Receipts:			
State of Kansas Gas Tax	16,776	18,510	21,190
County Gas Tax	2,475	2,680	4,500
Interest on Idle Funds	0	0	0
Total Receipts	**19,251**	**21,190**	**25,690**
Resources Available:	**21,807**	**25,296**	**25,691**
Expenditures:			
Personnel	2,863	3,765	3,500
Contractual	2,180	2,765	2,500
Commodities	183	2,765	3,000
Street Improvements	12,475	16,000	16,690
Total Expenditures	**17,701**	**25,295**	**25,690**
Unencumbered Cash Balance Dec 31	4,106	1	1

Adopted Budget

Water Utility Fund	Prior Year Actual 2003	Current Year Estimate 2004	Proposed Budget Year 2005
Unencumbered Cash Balance Jan 1	0	0	0
Receipts:			
Water Sales	80,118	80,000	80,000
Water Sales Tax	809	800	800
Connections	375	500	500
Misc., Meters, Grant Funds	257	500	500
Transfer of Funds			
Interest on Idle Funds	0	0	0
Total Receipts	**81,559**	**81,800**	**81,800**
Resources Available:	**81,559**	**81,800**	**81,800**
Expenditures:			
Personnel	18,003	21,000	20,000
Contractual	12,555	17,000	16,000
Commodities	4,505	5,000	4,000
Capital Outlay	1,459	3,800	2,800
Transfer to Water/Sewer Fund	43,011	28,125	39,000
1999 Project Fund Bond Retirement	2,026	6,875	0
Total Expenditures	**81,559**	**81,800**	**81,800**
Unencumbered Cash Balance Dec 31	0	0	0

Pretty Prairie

FUND PAGE FOR FUNDS WITH NO TAX LEVY

Adopted Budget Special Highway	Prior Year Actual 2004	Current Year Estimate 2005	Proposed Budget Year 2006
Unencumbered Cash Balance Jan 1	4,106	1,720	0
Receipts:			
State of Kansas Gas Tax	16,911	17,550	17,840
County Gas Tax	2,490	2,570	2,610
Interest on Idle Funds	0	0	0
Total Receipts	**19,401**	**20,120**	**20,450**
Resources Available:	**23,507**	**21,840**	**20,450**
Expenditures:			
Personal	2,506	2,500	2,500
Contractual	9,099	2,000	2,000
Commodities	1,361	2,000	2,000
Street Improvements	8,821	15,340	13,950
Total Expenditures	**21,787**	**21,840**	**20,450**
Unencumbered Cash Balance Dec 31	1,720	0	0

Adopted Budget Water Utility Fund	Prior Year Actual 2004	Current Year Estimate 2005	Proposed Budget Year 2006
Unencumbered Cash Balance Jan 1	0	0	0
Receipts:			
Water Sales	71,299	80,000	80,000
Water Sales Tax	720	800	800
Connections	450	500	500
Misc., Meters, Grant Funds	0	500	500
Transfer of Funds	1,379	0	0
Interest on Idle Funds	0		
Total Receipts	**73,848**	**81,800**	**81,800**
Resources Available:	**73,848**	**81,800**	**81,800**
Expenditures:			
Personal	21,734	20,000	22,000
Contractual	11,926	16,000	14,000
Commodities	7,727	4,000	5,000
Capital Outlay	1,069	2,800	2,500
Transfer to Water/Sewer Fund	31,392	39,000	38,300
1999 Project Fund Bond Retirement	0	0	
Total Expenditures	**73,848**	**81,800**	**81,800**
Unencumbered Cash Balance Dec 31	0	0	0

City of Pretty Prairie

FUND PAGE FOR FUNDS WITH NO TAX LEVY

Adopted Budget Special Highway	Prior Year Actual 2005	Current Year Estimate 2006	Proposed Budget Year 2007
Unencumbered Cash Balance Jan 1	1,720	4,242	3,802
Receipts:			
State of Kansas Gas Tax	17,483	17,460	17,960
County Gas Tax	2,608	2,550	2,620
Interest on Idle Funds	0	0	0
Total Receipts	**20,091**	**20,010**	**20,580**
Resources Available:	**21,811**	**24,252**	**24,382**
Expenditures:			
Personal	0	2,500	2,500
Contractual	0	2,000	4,000
Commodities	0	2,000	4,000
Street Improvements	17,569	13,950	13,882
Total Expenditures	**17,569**	**20,450**	**24,382**
Unencumbered Cash Balance Dec 31	4,242	3,802	0

Adopted Budget

Water Utility Fund	Prior Year Actual 2005	Current Year Estimate 2006	Proposed Budget Year 2007
Unencumbered Cash Balance Jan 1	0	0	0
Receipts:			
Water Sales	70,748	80,000	80,000
Sales Tax	715	800	800
Connections	625	500	500
Misc. Meters	100	500	500
Interest	1	0	0
Transfer of Funds	4,712	0	0
Interest on Idle Funds			
Total Receipts	**76,901**	**81,800**	**81,800**
Resources Available:	**76,901**	**81,800**	**81,800**
Expenditures:			
Personal	17,574	22,000	22,000
Contractual	12,743	14,000	14,000
Commodities	7,044	5,000	5,000
Capital Outlay	1,225	2,500	2,500
Transfer to Water/Sewer Reserve Fund	38,315	38,300	38,300
Total Expenditures	**76,901**	**81,800**	**81,800**
Unencumbered Cash Balance Dec 31	0	0	0

City of Pretty Prairie 2008

FUND PAGE FOR FUNDS WITH NO TAX LEVY

Adopted Budget Special Highway	Prior Year Actual 2006	Current Year Estimate 2007	Proposed Budget Year 2008
Unencumbered Cash Balance Jan 1	4,242	5,134	1,172
Receipts:			
State of Kansas Gas Tax	21,877	17,830	20,780
County Gas Tax	2,559	2,590	2,620
Interest on Idle Funds			
Total Receipts	**24,436**	**20,420**	**23,400**
Resources Available:	**28,678**	**25,554**	**24,572**
Expenditures:			
Personal	11,348	2,500	2,500
Contractual	6,881	4,000	4,000
Commodities	768	4,000	4,000
Street Improvements	4,547	13,882	14,072
Total Expenditures	**23,544**	**24,382**	**24,572**
Unencumbered Cash Balance Dec 31	5,134	1,172	0

Adopted Budget

Water Utility Fund	Prior Year Actual 2006	Current Year Estimate 2007	Proposed Budget Year 2008
Unencumbered Cash Balance Jan 1	0	0	0
Receipts:			
Water Sales	82,325	80,000	85,000
Sales Tax	831	800	850
Connections	475	500	500
Misc. Meters	0	500	500
Interest	0	0	0
Transfer of Funds from Water/Sewer Fd	238	5,000	5,000
Total Receipts	**83,869**	**86,800**	**91,850**
Resources Available:	**83,869**	**86,800**	**91,850**
Expenditures:			
Personal	27,347	27,000	22,000
Contractual	17,324	14,000	14,000
Commodities	8,781	5,000	5,000
Capital Outlay	4,100	2,500	7,500
Transfer to Water/Sewer Reserve Fund	20,242	30,200	35,250
Transfer to Water Meter Lease Fund	6,075	8,100	8,100
Total Expenditures	**83,869**	**86,800**	**91,850**
Unencumbered Cash Balance Dec 31	0	0	0